The London School of Economics and Political Science

# Why Governance Matters: A Comparative Study of the Causes of Deforestation in the Miombo Woodlands of Zambia and Mozambique, 1990 - 2010

Angus Fane Hervey

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# Declaration

I certify that the thesis I have presented for examination for the MPhil/PhD degree at the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

# Abstract

Between 1990 and 2010 sub-Saharan Africa experienced some of the highest levels of deforestation anywhere in the world. The problem has been particularly acute in what are known as the miombo woodlands of southern Africa. These occupy a unique ecological niche and are crucial to the livelihoods of millions of people in the region, yet are disappearing rapidly. The aim of this thesis is to identify the structural causes of this phenomenon in two of the miombo countries, Zambia and Mozambique. Standard 'resource based' explanations for deforestation in both countries tend to focus primarily on demographic and economic factors, emphasising the impact of economic reforms, population growth, rural migration, poverty, minimal access to electricty and a lack of institutional resources. However I argue that these explanations do not account for Mozambique's relatively better record on deforestation during the period in question, and that a more convincing account is offered by a 'governance based' explanation, which emphasises different forms of forest governance and institutional arrangements affecting the forest sector in each country. Specifically, Mozambique has fared better than Zambia thanks to its more secure system of traditional land tenure, the implementation of more progressive legislation and a sustained commitment to community based natural resource management. The implication is that future initiatives to curb deforestation in these countries should concentrate on addressing institutional and policy based shortcomings before implementing market based mechanisms designed to encourage conservation.

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# Acronyms and Abbreviations

CBNRM – Community Based Natural Resource Management
CCF - Chief Conservator of Forests
CDM – Clean Development Mechanism
CSD - Commission on Sustainable Development
DBH – Diameter Breast Height
DNFFB - Forestry and Wildlife Services
DNTF - National Directorate of Lands and Forestry
DUAT - Direito De Uso E Aproveitamento Da Terra
EDM - Electricidade de Moçambique
EKC – Environmental Kuznets Curve
EMT - Ecological Modernisation Theory
ETS – European Trading Scheme
EU – European Union
FAO – Food and Agricultural Organisation
FDA - Agricultural Development Fund
FDI – Foreign Direct Investment
FINIDA - Ministry for Foreign Affairs of Finland
FRA – Forest Resource Assessment
FRELIMO - Liberation Front of Mozambique
FSP - Forest Support Program
GDP – Gross Domestic Product
GHG – Greenhouse Gas
GIS – Geographical Information Systems
HDI – Human Development Index
HIPC – Heavily Indebted Poor Countries
IFF – International Forum on Forests
ILUA – Integrated Land Use Assessment
IMF – International Monetary Fund
IPF - Intergovernmental Panel on Forests
JFM – Joint Forest Management
LOLE - Law on the Organization of the Local State
MADER - Ministry of Agriculture and Rural Development
MINAG – Ministry of Agriculture
MITUR – Ministry of Tourism
MMD - Movement for Multiparty Democracy
MPD – Ministry of Planning and Development
MSS - Multispectral Scanner System
MTENR – Ministry of Tourism, Environment and Natural Resources
NLBI - Non-Legally Binding Instrument on All Types of Forests
NWFPs – Non-Wood Forest Products
ODA – Overseas Development Assistance
OECD – Organisation for Economic Cooperation and Development
PFAP – Provincial Forestry Action Plan
R-PIN – Readiness Plan Idea Note
PROAGRI - National Agricultural Program
PSRP - Public Service Reform Program
REDD – Reducing Emissions from Deforestation and Degradation
RENAMO - Mozambican National Resistance
SADC – Southern African Development Community
SAP – Structural Adjustmnent Program
SI – Statutory Instrument
SPFFB - Provincial Services of Forestry and Wildlife
UNCED - United Nations Conference on Environment and Development
UNDP – United Nations Development Program
UNEP – United Nations Environmental Program
UNFF - United Nations Forum on Forests
UNHCR – United Nations High Commissioner for Refugees
UNICEF – United Nations Children's Fund
UNIP - United National Independence Party
WISDOM - Woodfuels Integrated Supply Demand Overview Mapping
ZAWA – Zambia Wildlife Authority
ZESCO - Zambian Electricity Supply Company
ZFAP – Zambia Forestry Action Plan
ZFC – Zambian Forest Commission
ZFD – Zambian Forest Department

*"It is not so much for its beauty that the forest makes a claim upon men's hearts, as for that subtle something, that quality of air that emanation from old trees, that so wonderfully changes and renews a weary spirit."*

Robert Louis Stevenson (1905: 171)

*"We are standing on the lip of a great escarpment, gazing down a wide valley to the vast, seemingly unpopulated expanse beyond. The numerous hills and ridges are colour coded: yellow, black and dusty green mean 'near'; memory blue means 'far'; but how far is 'far' I cannot begin to guess. In the near distance pools of sunlight scud across the ground, like spotlights being operated by someone wishing to draw our attention to the finer, not-to-be-missed details of what is laid out before our marvelling eyes."*

Guy Scott (2010)

*"A month before the rains set in, the miombo covered hills burst all at once into reds, salmons, pinks and coppery tinges of all hues as the Brachystegia trees flush into young leaf and, within a week, all this riot of colour has blended into a forest of the freshest green carpeted with legions of flowers. In full leaf the miombo is delightfully cool and shady, and the scanty grass a pleasure to walk through. In the dry season, what a change! The whole miombo forest becomes entirely leafless, while grass fires burn up all the grass and leaf litter. The sun beats down unmercifully and whichever way one turns there is the same view, the grey stems of miombo trees fading into the shimmering distance. The buzz of insect life has vanished, except for the sharp hiss of tsetse fly."*

D.B. Burtt (1946) quoted from Rodgers (1998: 25)


Figure 1: Plateau Miombo, Muchinga Escarpment, Northern Zambia. *Image courtesy Stephen Robinson / WILDFOTO*

# 1

# Deforestation in the Miombo Woodlands

The story of human life on this planet is bound up with the story of our relationship with forests and the ways in which they have shaped the cultural, political, economic and technological evolution of successive human societies over millennia. Along with the world's atmosphere and oceans, forests constitute one of our most important global commons, offering renewable raw materials and energy, protecting land and water resources, providing recreational facilities, maintaining biological diversity and regulating our climate. Beyond purely material considerations most people are also aware of forests' cultural and symbolic meanings, embodied in our various forms of story-telling, religion, legends and myth.

Yet as a species we display a tendency to destroy rather than conserve forests. This is not a new phenomenon; humans have always cut down forests to provide fertile land for settlement, pasture and crops, for wood to build their homes and for fuel to give them energy. Until recently though our limited physical capacity meant that changes to forests as a result of human activities took place over many generations and on a relatively limited geographical scale. In the last half century that process has changed beyond all recognition. According to the latest global assessment by the United Nations Food and Agriculture Organisation (UN-FAO) we are witnessing the largest and fastest period of deforestation in the earth's history. Since 1990, the average global rate of deforestation has been 4.9 million hectares per annum, equivalent to the loss of an area of forest the size the United Kingdom every five years (UN-FAO 2011).

Such drastic changes have not gone unnoticed; the problem of deforestation has long been a rallying call for environmentalists and its palpable negative externalities are well

documented. It results in the loss of biodiversity, flooding, loss of topsoil, gullying, the loss of cultivable land further down the watershed and eventually, desertification (Sedjo 1992; Grainger 1993; Kramer et. al. 1997; Ehrhardt-Martinez 1998). At the global level, it involves the removal of one of the earth's major carbon sinks (Houghton 2005; Chomitz et. al. 2006; Stern 2007). Currently, the carbon released from deforestation activities accounts for 13 to 17 per cent of global greenhouse gas (GHG) emissions every year, greater than the contribution via emissions from vehicles such as cars, trucks and buses, and on about the same scale as all fossil fuel emissions from China or the United States (WRI 2008; van der Werf et. al. 2009).

For developing countries collectively, land use, land use change, and forestry activities constitute an estimated one third of their total emissions (WRI 2005). Preventing deforestation has thus been identified as a highly cost effective strategy to mitigate future climate change impacts. Unfortunately, while there is a clear and growing consensus around the need to address the problem, the difficulty of diagnosing its structural causes means there is very little agreement on how best to go about it. This is what makes deforestation a good topic for social science research – it is a phenomenon which poses a severe threat to an important environmental resource, yet the origins and structural causes of that threat are often poorly understood.

In this thesis I investigate the proximate and structural causes of deforestation in the miombo woodlands of southern Africa. These occupy a unique global biological niche, and offer a range of environmental services to millions of people in the form of fuelwood, food, medicine, fertile land and watershed control. Despite this miombo forests are some of the most poorly studied in the world. In part, this is due to the nature of the forests themselves – miombo is a temperate dry forest, and is different from the tropical forests of some other developing countries which tend to be richer in biodiversity and more spectacular visually. There is also a regional element involved; when people think about forests in Africa (if at all), they usually think about the jungles of the Congo Basin countries, home to the gorillas and warring rebels of popular discourse. Forests are not usually associated with southern and eastern Africa, which are more famous for their savannahs and abundant wildlife.

The recent explosion of interest in forests sparked by the recognition of their potential as stores of carbon has also largely passed the miombo woodlands by. This is because

carbon stocks in undisturbed miombo woodland soils hold between ten to 60 tonnes of carbon per hectare, while tropical equivalents hold upwards of 180 tonnes of carbon per hectare. Yet the miombo woodlands are disappearing far more rapidly than the world's rainforests. The average annual rate of loss is up to 1.7 per cent in some of the miombo countries, equivalent to deforestation rates in Indonesia, and significantly higher than rates in Brazil and the Democratic Republic of Congo (IIED 2010; UN-FAO 2011). During the same period many of the miombo countries have experienced significant population growth, rapid urbanisation, wide ranging economic reforms and increases in foreign direct investment and trade and financial flows. While such changes have arguably contributed to sustained periods of economic growth, they have not always resulted in socially equitable or environmentally sustainable outcomes. This raises significant questions about how the forests of the miombo countries should be managed, by whom and for whose benefit, requiring governance answers at the local, national, regional and international levels (Andersson et. al. 2004).

## What is 'miombo'?

Miombo is the vernacular term for the dry, seasonally decidous forests that are endemic to southern Africa. It is distinguished from other African savannah, woodland and forest formations by the dominance of tree species in the legume subfamily *Caesalpinioideae*, particularly in the genera *Brachystegia, Julbernardia* and *Isoberlinia* (Campbell 1996). Miombo usually comprise an upper canopy of umbrella shaped trees, a scattered layer of subcanopy trees, a discontinuous understorey of shrubs and saplings and a patchy layer of grasses. Most of the tree and shrub species shed their leaves in the late dry season, after which miombo vegetation is bare for a short time, usually around three months. A few weeks to a month before the onset of the rains, the trees flush again and cover the countryside with bright green or red foliage. Most miombo trees and shrubs flower in the same period immediately before the rains.

Miombo is generally situated in nutrient poor soils with rainfall varying between 650 and 1400 mm a year. This is responsible for one of its more unusual characteristics - the nature of its mycorrhizal associations. Botanically, the term mycorrhiza describes a range of symbiotic structures formed between soil borne fungi and the roots of plants (Hogberg 1982). Being highly specialised in their nutritional requirement, the mycorrhizal fungi obtain simple sugars, amino acids and plant growth substances from the host for growth and development. In return, the plant gains the benefits of the fungus's higher absorptive capacity for water and mineral nutrients, giving it greater adaptability to adverse conditions and tolerance to root diseases (Molina et. al. 1992).

What is interesting is that, unlike the majority of other plant systems which show endomycorrhizal associations, miombo's root systems are predominantly ectomycorrhizal. This means that the fungus does not penetrate the individual cells within the root, but lives on the outside, forming a mantle or sheath known as the 'Hartig net' (Trappe 1962). This connects in turn to long, branching filamentous structures of a fungus in the surrounding soil called hyphae. Taken together, the hyphae form massive vegetative structures known as mycelium. In this way, the ectomycorrhizal roots acquire access to a much greater soil volume in contrast to endomycorrhizal systems, and the effective surface area for nutrient absorption is greatly increased. Given the poor quality of soils in the miombo eco-region, this has proven to be a crucial evolutionary adaptation for the forests' survival.

The nature of mycelium will be familiar to anyone who has seen the movie *Avatar* (2009). They create the largest living organisms in the world, stretching across thousands of square kilometres, and sometimes living for thousands of years (Stamets 2005). In the miombo woodlands, they result in the proliferation of hundreds of different species of mushroom, which has led to culture of mushroom gathering among indigenous people that is widespread in the miombo woodlands, but largely absent in other African woodlands (Buyck, et. al. 2000; Tibuhwa 2001; Härkönen, et. al. 2003). Zambia for example is home to over 75 different types of edible mushroom, including the world's largest and by some accounts, tastiest mushroom known by locals as Chingulungulu (*Termitomyces titanicus*).


**Figure 2**: The miombo eco-region
*Source: Campbell (1996)*

The miombo eco-region covers a total area of around 2.7 million km$^2$, including substantial parts of Angola, Malawi, Mozambique, Zambia and Zimbabwe, and extending as far north as the United Republic of Tanzania and the Democratic Republic of the Congo. It is a rich and diverse biological zone, playing host to 4,590 plant species, 35 endemic mammals (including about half the elephants and half of the rhinos left in

Africa), 51 endemic birds, 52 endemic reptiles, 25 endemic amphibians and an unknown number of endemic invertebrates (IIED 2010; Byers 2001). Around 12 per cent of its total surface area is protected, and it contains the catchment basins for most of the main rivers of southern Africa, two of the African Great Lakes (Lake Malawi/Niassa and Lake Tanganyika) and the Okavango Delta (Byers 2001).

The eco-region is also home to approximately 100 million people, of whom about 75 million are poor and live in rural areas (IIED 2010). Around 39 million of these rural poor rely directly on miombo forests for conversion to cultivated areas or plantations, collection of edible plants and animals, medicinal plants and honey, fuelwood, charcoal to earn income, wood for construction purposes, erosion control and regulation of water supplies (Nhantumbo et. al. 2001; Backéus et. al. 2006). For these people the forests act as the main source of subsistence, income and as a 'safety net' in times of need (Angelsen & Wunder 2003; Vedeld et. al. 2007). A further 15 million people living in urban areas in the miombo eco-region depend on a steady flow of goods from the forests in the form of wood products such as timber, poles, firewood and charcoal), and non-wood forest products (NWFPs) such as honey and beeswax, edible insects, rattan, bamboo, fibre, fruits, mushrooms, roots and tubers and medicinal plants (Ng'andwe et. al. 2006: 24).

Figure 3: Miombo canopy / under-canopy / grass. *Image courtesy Stephen Robinson / WILDFOTO*


Figure 4: Miombo woodlands and Inselbergs, Mutinondo Wilderness, Northern Zambia. *Image courtesy Stephen Robinson / WILDFOTO*


Figure 5: Miombo woodlands in new leaf, Mutinondo Wilderness, Northern Zambia. *Image courtesy Stephen Robinson / WILDFOTO*


Figure 6: Ceswa Falls and Plateau miombo woodland, Northern Zambia. *Image courtesy Stephen Robinson / WILDFOTO*

## The key argument

The central research question of this thesis is as follows: what were the structural causes of deforestation in the miombo woodlands of Zambia and Mozambique between 1990 and 2010? In answering this question, I hope to explain why Zambia experienced relatively higher levels of deforestation during this period than Mozambique. I also hope to develop a better understanding of why deforestation occurs not only in these countries, but also the miombo eco-region as a whole. The argument that I present in the following pages is that different rates of deforestation can be attributed to country specific forms of policymaking and institutional design. This contradicts conventional, *resource based explanations* which tend to emphasise the role of underlying demographic or economic factors.

The approach is rooted in critical perspectives on political economy, since it questions the status quo and interrogates the links between dominant structures, power and markets and the ways in which these undermine social and environmental justice. It takes as its starting point the work of Polanyi (1957) who argued that there is nothing natural about so-called 'laissez-faire' style economic policies, and that free markets are deliberate constructions embedded into the social fabric of societies that could, "never have come into being merely by allowing things to take their course" (Polanyi 1957, 139). However, Polanyi also argued that markets have natural limits, and that counter-movements will always arise in order to stem their reach and impact and result in policies to mitigate their associated human and environmental costs. Social history in the last two centuries is thus the result of a double movement; while on the one hand markets have spread all over the face of the globe, on the other networks of measures and policies have been integrated into powerful institutions designed to check the action of the market relative to labour, land, and money.

In the last two to three decades market logic has predominated, with the material changes in production, trade and finance associated with globalization increasing the pressures on governments as well as the competition among them as they seek to generate wealth through the attraction of investment by multinational corporations and internationally mobile capital (Garrett & Mitchell 2001). The combination of these pressures has given rise to what Cerny has called the 'competition state,' characterised by a "subordination of policy formulation to signalling creditworthiness so as to attract and retain private portfolio capital flows… largely irrespective of the citizenship of the legal owners of capital" (Cerny 1990, 27). Thus, as global competition increases governments find it

increasingly difficult to protect their citizens and their environmental resources from the polarising effects of the market.

I argue that in Zambia and Mozambique "governance matters" because it mediates these effects of globalisation, defining the impact of market forces on forests and generating distinctive policy patterns. I call this the *governance based explanation* for deforestation. In order to justify this argument I compare and contrast the proximate causes and structural causes of deforestation in both Zambia and Mozambique between 1990 and 2010. The logic behind this is as follows: for many of the indicators that conform to prevailing theories about drivers of deforestation, Mozambique and Zambia are roughly equal. They are of a similar geographical size, share similar types of climate and vegetation and are both heavily forested. Their rates of population growth and patterns of rural migration during the period in question have been roughly equivalent, and both have experienced rapid economic growth since liberalising their economies in the early 1990s. However despite some noticeable advances in poverty reduction the majority of their citizens are still very poor and remain heavily reliant on subsistence agriculture and fuelwood for their energy needs.

According to resource based explanations which emphasise economic and demographic drivers of deforestation we should, therefore, expect similar levels of deforestation in Zambia and Mozambique. However between 1990 and 2010 Mozambique emerged with a significantly better record with a reduction in its overall area of forested land of 260,000 ha per annum compared to reduction of 425,000 ha per annum in Zambia. This seems strange, particularly since Mozambique has a much higher population density than Zambia. Given the similarity of many of the underlying socio-economic conditions in these two countries it appears that the resource-based explanation misses out an important part of the puzzle.

This missing piece is the role of governance and institutions. Specifically, there are two reasons for Mozambique's relatively better record. The first is arrangements around land tenure. In Mozambique, land reforms have given communities stronger guarantees to land via a formal legal arrangement and fewer obstacles to obtaining the rights to use that land as they see fit. Community custodianship is over natural resources and the land itself, promoting more sustainable long term usage and creating greater long term incentives to maintain forest health. Greater land tenure security has also meant that

communities can enter into negotiations with developers on a more even playing field and can therefore can derive greater benefits from forests. In Zambia, by contrast, tenure is insecure thanks to a system which leaves land open to confiscation by traditional and statutory authorities. This means that owners of forest patches have fewer incentives to use the land with a view towards long term conservation.

The second institutional factor which has made a difference is the existence of legislation promoting participatory forms of forest governance. In Mozambique, the implementation of this kind of legislation has allowed for the partial devolution of forest governance to communities, and has led to better forms of cooperation between officials and forest users. It has also resulted in increased revenues from the forest sector, and has created better monitoring and more incentives towards the sustainable use of forests via benefit sharing mechanisms for forest guards and forest communities. In Zambia though, while progressive forms of legislation have been proposed, they have not been implemented. The absence of clear policy or legal guidelines has led to a breakdown in revenue collections, a lack of benefit sharing mechanisms, low morale amongst officials and poor relationships between the authorities and forest communities. This has resulted in greater overall levels of deforestation in Zambia than in Mozambique.

Importantly, the governance based explanation does not argue that demographic and economic drivers of deforestation have had no effect in Zambia and Mozambique. Indeed, these constitute an important part of the story in each case. High rates of migration to rural areas in both countries in the early 1990s resulted in rampant deforestation as a result of agricultural and charcoal production activities. This was compounded by the implementation of economic liberalisation programs at the time, and in particular, reforms to each country's agricultural sectors which left rural smallholders without access to inputs or markets to sell their produce. This meant farmers were forced to use more land, less efficiently in order to keep up overall production, resulting in higher levels of deforestation. Continued high rates of poverty and a lack of access to electricity in both countries have also created a thriving charcoal trade, exacerbating forest losses.

Instead, the argument is that, given the similarity of economic and demographic drivers in each country, only a governance based explanation can account for Mozambique's relatively lower rates of deforestation. This conclusion is especially important in the

context of trying to understand why deforestation occurs in other miombo countries, since key questions exist about the shape of their current and future public and private policy options for the management and supervision of their forests. The problem boils down to a simple dilemma: the countries of the miombo eco-region are those that are the most in need of addressing the problem of deforestation, yet they are also the least able to do so.

## Some key terms

Before going any further, it is perhaps useful to define what is meant by a few of the terms employed so far. The phenomenon under investigation in this study is *deforestation*, which refers to the total destruction of forest habitats, typically by clear-cutting or conversion to other land uses such as agriculture. This is different from *degradation*, which refers to a change in the quality of forests and forest ecosystems via the loss of key species. This is most often a result of selective logging, the extraction of non-timber forest products (fruits, plants, wild meat, etc.), the building of infrastructure associated with these practices and uncontrolled fires. Although qualitatively different the two phenomena are closely linked. This is because forest degradation makes land use change easier, and therefore may lead to full scale deforestation. In other words degradation often acts as the precursor to deforestation. Accordingly while this project is concerned primarily with explaining the causes of deforestation, it does take degradation into account as an indirect cause.

The other key distinction is between different levels of analysis. Most people are usually aware of what are known as the *proximate causes* of deforestation – the socio-economic activities that impact on forests, such as subsistence agriculture, cash cropping, cattle ranching and logging (Geist & Lambin 2001). These proximate causes can have either direct effects (e.g. the clear felling of forest lands by farmers for subsistence agriculture) or indirect effects (such as the construction of a road for logging which makes it easier for those farmers to access those lands). Understanding the proximate causes of deforestation though, is primarily an observational exercise – real analysis begins when trying to understand the backgrounds and preferences of the agents of deforestation, such as small farmers, ranchers, loggers and plantation companies, and how their sets of available choices are influenced by factors such as prices, technology, legislation, new information and access to services and infrastructure.

These factors are in turn the result of a larger set of underlying drivers or *structural causes,* seen to be the fundamental forces that underpin the more obvious proximate causes. According to Geist and Lambin (2001: 8), structural causes can be thought of as a complex of social, political, economic, technological, and cultural variables that constitute initial conditions in the human-environmental relations that are structural (or systemic) in nature. In terms of spatial scale, these causes may operate directly at the

local level, or indirectly from the national or even global level. Kaimowitz & Angelsen (1998: 95) point out that "it is more difficult to establish clear links between underlying factors and deforestation than between immediate causes (…) and deforestation [since the] causal relationships are less direct". The drawback in analysing the problem of deforestation at the deeper, underlying level of structural causes is therefore that it involves a greater level of abstraction and a greater risk of uncertainty, subjectivity and ideological posing (Lanly 2003).

The other problem is that the relationship between different levels of analysis is seldom very neat and their interaction is often quite complicated. Take the hypothetical situation of an increase in fuel prices due to a decision by government to reduce fuel subsidies. This results in a slowdown in the demand for timber as manufacturing output slows. At the same time small scale loggers, unable to afford increased transportation costs, go out of business, further reducing the pressure on forests. However the increase in fuel prices also means that alternative sources of energy such as fuelwood and charcoal become relatively cheaper, and demand for them increases. And over time, as small scale loggers leave their concessions open, rural smallholders move in to convert previously forested land into cultivated land, creating new pressures on forests.

The overall effect is therefore often difficult to quantify and depends to a large extent on context specific factors such as the size and makeup of both the formal and informal forest products sector, the economy wide balance of energy sources, demand for land, agricultural policy and the effectiveness of forest monitoring services, to name just a few. What this shows is how easy it to lose track without clear distinctions between the units of analysis and a good idea of what kind of drivers one is looking for. Accordingly this research project recognises that a detailed understanding of the complex set of both the proximate causes and structural drivers affecting forest cover changes in a given location is required prior to any policy intervention (Geist & Lambin 2002). In this context, it is worth noting the advice of Ragin (1987: 25) who points out that it is, "the intersection of the set of conditions in time and space that produce many of the large scale qualitative changes, as well as many of the small scale events, that interests social scientists, not the separate or independent effects of these conditions."

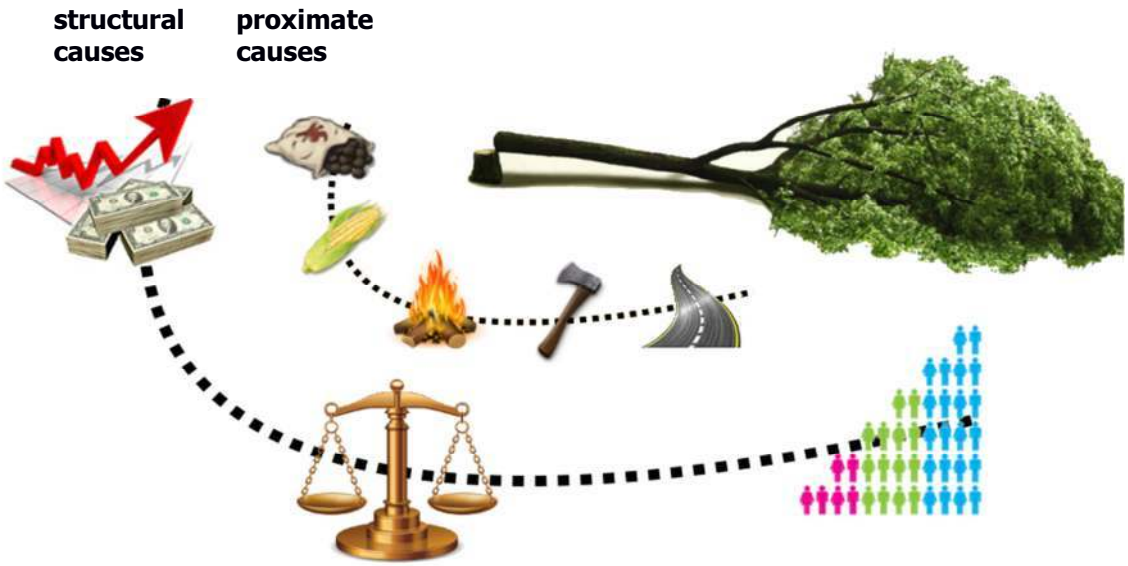


**Figure 7**: The difference between structural causes and proximate causes of deforestation
*Source: Author's own image*

In this thesis, I group the structural causes of deforestation into three different categories – demographics, economics and governance-related causes. These play out in different and complex ways. Understanding the effect of *demographic* drivers for example, requires understanding the political and economic contexts in which population growth and population change occurs, how it is concentrated in certain geographical areas and push and pull factors driving people to move between urban and rural areas. The impact of *economic* drivers is also difficult to predict. Economic growth for example, might tend to make deforestation worse through industrialisation and demand for primary products, yet in other cases may result in productivity increases and growing awareness about environmental problems.

It is also apparent that individuals and communities at varying levels of economic development interact with forests in different ways. In the case of the miombo eco-region this usually boils down to questions about poverty and inequality, and how these factors affect the behaviour and incentives of people that use forests and forest products. Another important factor is the international context in which economic growth and development occurs since rates of deforestation are affected by both macroeconomic factors such as debt, trade and financial liberalisation, and policy choices such as privatisation and decentralisation. In the case of the miombo countries the kinds of

macroeconomic policies implemented during the last two to three decades have been heavily influenced by international financial institutions and development partners, and the impact of those policies has not always been benign.

Possibly the most important set of structural causes to consider however, are classified in the literature under the labels of *institutions* and *governance*. What exactly is meant by these terms? The classic contribution by North (1990; 1994) defines institutions as the formal and informal rules that structure incentives in human exchange and behaviour, whether political, social or economic. Ostrom (1990), a fellow Nobel Laureate, sees them as the rules, conventions and norms that determine who is eligible to make decisions, what information must or must not be provided and what payoffs will be assigned to individuals dependent on their actions. Accordingly it seems appropriate to define institutions as "the formal and informal rules that constrain political, economic and social interaction via the structuring of incentives and the determination of choices."

'Governance' is a far broader term. According to Rosenau (1992: 5) it is the set of regulation mechanisms in a particular sphere of activity which function effectively even though they are not endowed with formal authority. Kemp, Parto and Gibson (2005) suggest that is "how one gets to act, through what types of interactions and the extent to which actors adhere to collective decisions," while Keohane and Nye (2000: 12) define governance as "the processes and institutions, both formal and informal, that guide and restrain the collective activities of a group." Governance should therefore be thought of as a continuing process (Kaufman (2007b: 29) relying on different types of institutional arrangements, in which authority is conferred, conflicting or diverse interests are accommodated and cooperative action is taken.

It is also important to note that governance takes place in overlapping spheres of activity and at multiple levels (e.g. local, national and international). This is because while the state represents an important type of governance structure, there are many other social and political units (such as families and clans, firms and local government actors at the subnational level, and corporations, NGOs and international standard-setting bodies at the supranational level) that govern social interactions. Thanks to globalisation, important shifts in the locus of governance have also occurred – migrating up to supranational organizations; down to newly empowered regions, provinces, and municipalities; and laterally to actors such as multinational firms and transnational NGOs (Held et. al., 1999).

According to Peters and Pierre (2002: 133), this emergence of 'multi-level governance' challenges traditional understandings of "how the state operates, what determines its capacities, what its contingencies are, and ultimately of the organisation of democratic and accountable government."

In this sense 'governance' is a far broader term than 'government.' This is because in a political and economic order increasingly characterised by international political, economic and administrative coordination, economic globalisation and growing subnational assertiveness, political power now comes not only from formal constitutional powers and the state's monopoly on the use of force, but from the ability to marshall and direct resources to rent-seeking public and private actors (Peters and Pierre, 2002). Where 'government' conjures up an image of formal structures ruling over people, the notion of governance revolves around the increasingly important role of formal and informal arrangements, the blurring of boundaries between public and private sectors and their responsibilities for tackling social issues, the power dependence involved in the relationships between institutions involved in collective action, and the capacity to get things done which does not rest on the power of government to command or use its authority (Stoker, 1998).

Finally, it is importnant to point out that in the area of environmental regulation, the definition of what constitutes 'good governance' is still contested. Often the concept is given normative as well as descriptive weight. It can be used, for example, by those wishing to reduce the range of activities of national governments via reforms to state programmes and bureaucracies. This is the definition offered by the European Commission, which suggests that good governance consists of openness and participation, accountability, effective coherence, efficiency and greater sensitivity to the immediate context that is promised by subsidiarity (CEC, 2001). As such, this view of good governance seems concerned primarily with minimising bureaucratisation and hierarchy. The problem of course is that in practice this may be adopted to serve the neo-liberal agenda of reducing the role of governments in favour of market mechanisms and corporate interests (World Bank, 1992; OECD, 2002). Even if this does not 'hollow out' the core governance functions of states it may lead to homogenous institutions and policies that favour the most mobile factors of production, often at the expense of governments' ability to adopt policies that respond to the needs of their societies (Hewitt de Alcantara, 1998).

## Structure of the study

In the chapters that follow, I develop my argument in detail. To recap – the miombo woodlands are an important environmental resource, yet in the last two decades they have experienced high and unsustainable rates of deforestation. The structural causes of this phenomenon can be attributed to country specific forms of policymaking and institutional design; an argument which I call the governance based explanation for deforestation. This contradicts the conventional resource based explanation which tends to emphasise the role of demographic or economic factors. In **Chapter Two** I provide the conceptual framework from which these two types of explanation are derived. I begin by looking at demographic factors, such as the 'problem' of population growth and population density and the impact of different patterns of migration. I then move on to look at the role of economic factors, discussing the impact of income growth, development, poverty, macroeconomic policy and trade and investment. Finally, I look at governance factors, analysing the role of political systems, land tenure and property rights, participatory forms of natural resource management, decentralisation and international institutional arrangements for forest governance.

In **Chapter Three,** I outline the research design, beginning with a justification for the use of the comparative case study based approach. I argue that this offers the best methodological approach since it allows for a controlled case comparison as an approximation to the logic of experiments, while including rich and detailed case studies which can be considered as insight generating on their own terms. I then discuss the comparative logic itself, showing how Zambia and Mozambique are at the same time both 'similar' and 'incomparable' enough to justify as the choice for the two individual case studies. In particular I emphasise the choice of governance as the most likely determinant of difference between their rates of deforestation during the last 20 years. I conclude the chapter with a description of the fieldwork, which took place over six months in 2011 and included interviews with more than 120 people and six individual site trips to deforestation 'hotspots' in each country.

In Chapters Four to Six I present my research findings. I begin in **Chapter Four** by tackling the problem of establishing accurate figures on rates of deforestation in Zambia and Mozambique. Existing data is poor thanks to a lack of reliable past inventories and methodological innacuracies. I therefore make the most accurate possible estimates

using hard to get institutional data and guidance from experts in each country. In the second part of the chapter I analyse the proximate causes of deforestation in Zambia and Mozambique. I argue that these consist of a 'vicious cycle' of shifting cultivation, charcoal production and uncontrolled burning. These are important to identify since they provide important clues about the deeper, structural causes and eliminate potential methodological distortions in trying to compare and contrast those causes across the case studies.

In Chapter Five, I look at the structural drivers of deforestation in Zambia. I begin with a discussion around the impact of structural adjustment programs implemented in the early 1990s. These resulted in urban to rural migration and a return for large sectors of the population to subsistence activities such as agriculture and charcoal production. These problems have been subsequently exacerbated by failures in agricultural reforms, high rates of poverty and the continued reliance of most citizens on woodfuel for their energy needs. I then proceed to discuss governance related factors. I show how forest governance has been crippled, first by public sector cuts made in the 1990s and subsequently by a failure to implement policy and legal guidelines. This means that forest governance remains highly centralised and poorly managed. These problems have been compounded by the dual system of land tenure, designed to accommodate Zambia's traditional authorities on the one hand and formal government bodies and investors on the other.

In Chapter Six, I conduct a similar analysis for Mozambique. I describe how, following the end of the civil war, rural areas witnessed the influx of millions of returning refugees, who turned to subsistence agriculture and charcoal production in order to survive. This occurred in conjunction with agricultural reforms which left farmers without access to either inputs or markets. As a result they were forced to clear more land, less efficiently. These problems were compounded by a growing charcoal trade, poverty and a lack of access to electricity. I then describe how Mozambique's forest sector has suffered from a lack of capacity and funding since the end of the civil war and how, in recent years, it has also faced challenges from increased rates of illegal logging by foreign actors. However, I also show that thanks to legal reforms in land administration and commercial logging, local communities have been given greater incentives to conserve forests, with some encouraging results.

In Chapter Seven, I compare and contrast my findings from the two case studies. Using a comparative analysis, I explain why institutional and governance related factors offer the most convincing explanation for the difference in rates of deforestation in Mozambique and Zambia. In particular, I emphasise the impact of their different arrangements for land tenure, and the institutional and legislative factors that have resulted in the two countries' divergent approaches to forest governance. I also situate my findings within the theoretical debates around drivers of deforestation, and show how they advance scholarship in this area. I conclude with a number of policy implications, and suggest some promising avenues for future research into the problem.

# 2

# The Structural Causes of Deforestation: A Conceptual Analysis

## Demographic Factors

The issue of demographics seems to be an obvious place to start a discussion on deforestation. Human populations exist side by side with forests – and unlike with other environmental commons such as oceans and the atmosphere, humans compete directly with forests for land. We have good reasons to believe that as societies develop and grow, they use both land and forest resources more intensively, and as evidence, can point to a historical record replete with stories of vanished forest landscapes. Diamond (2003) for example, recounts the story of the demise of the Polynesian community that settled Easter Island. He argues that in the process of creating a society of agricultural chiefdoms, increased resource competition amongst different factions led to rampant and unsustainable deforestation. This made it impossible for them to build the canoes required to catch the fish that were a key supply of food and resources, and created erosion that encouraged further deforestation and reduced agricultural yields. The population eventually collapsed, bringing an abrupt halt to the construction of Easter Island's famous stone heads, and offering a dramatic example of the potentially disastrous effects of overpopulation in an area of limited natural resources.

Diamond's account belongs to a rich historical tradition. More than two hundred years ago, Thomas Malthus cautioned that human populations increase geometrically, while the means of production, constrained by land scarcity, the limited production capacity of cultivated land and the law of diminishing returns, can only increase in an arithmetic

ratio. He suggested that the eventual result would be widespread poverty and starvation, which, when combined with common diseases and epidemics, wars, infanticide and famine, would result in population collapse. According to Malthus (1798 [1970]: 5) the relationship between human societies and the resources they use is therefore governed by the 'self-evident truth' that population will always be kept in check by the principles of natural law – a cause, "intimately united with the very nature of man (...) the constant tendency in all animated life to increase beyond the nourishment prepared for it".

While Malthus's ideas have been immensely influential, they have also generated considerable opposition. His chief contemporary antagonist, William Godwin (1793 [1971]), suggested that humankind's fate is fixed by social institutions rather than universal laws of nature, and that Malthus's determinism ignored the ability of societies to reorganise themselves in such a way as to avoid natural constraints on population growth. Karl Marx (1867 [1976]) and Friedrich Engels (1892) were also notable opponents, criticising Malthusian theory for formalising what they saw as a specific historical form of exploitation between wage workers and capitalists and between landed and industrial interests as a natural law of necessity. In their view, it was the means of production that placed pressure on the population, rather than the other way around. As Gimenez (1977: 13) points out, the Marxist critique, while acknowledging the existence of the problems that stem from high dependency ratios and high rates of population growth, also shows that the Malthusian treatment of the 'population' problem overlooks the social, political, and economic structural factors that make possible such population patterns and processes in the first place.

History seems to have proved Malthus's critics correct. Thanks to a number of factors such as technological developments, changes in governance, changes in societal relations and migration, population growth has continued at an ever increasing rate since Malthus's time (Wolfgram 1999). In the last half century global population has increased from three to seven billion, and according to the latest medium fertility projections of the UN, will continue to grow throughout this century, reaching 9.3 billion in 2050 and 10.1 billion in 2100 (UN 2011). Nevertheless in the modern era the Malthusian premise continues to resonate, having gained newfound publicity in the work of a number of ecologists and economists during the 1970s and 1980s. This neo-Malthusian revival is best represented by the work of Ehrlich (1968; 1990; 1996) and Hardin (1968) who issued stark warnings about the limits of the world's environmental resources. They

suggest that an increase in the numbers of people using resources tends to have a cumulative and non-reversible impact on the environment, which has a limited 'carrying capacity' – the ecological characteristics of land relative to the population influx in that particular destination. Their warnings are dire, with predictions of mass starvation and the death of 'hundreds of millions' (Ehrlich 1968).

### Population growth and forests

Despite convincing theoretical critiques (Commoner 1971; Harvey 1974) and the subsequent failure of doomsday scenarios to materialise, much of the early deforestation literature has tended to take neo-Malthusian ideas as a given, positing a direct correlation between population growth and the clearing of forested lands for human settlement and land use. The process by which this occurs was usually explained in terms of the 'extensification of agriculture'. This suggests that growth in population is accompanied by growth in demand for food, which in turn may mean growth in demand for arable land, and hence forest clearance. Such was the dominance of this view in the literature that the UN's Food and Agricultural Organisation (FAO) estimated global deforestation rates using a model of population pressures as recently as 1990, implying that the percentage change in forest area depends directly on the rate of population growth (FAO 1990).

Since the 1990s though, a number of authors have argued that the classic tendency to frame the debate around these kind of neat, linear relationships is too simplistic (Cropper & Griffiths 1994; Dietz & Rosa 1994; Rudel & Roper 1997; Scotti 2000; Reis & Blanco 2000). The forerunner for this line of thinking was the work of Boserup (1976; 1981) who argued that as population grows relative to forest area, there is a tendency to use land more intensively, increasing agricultural output per unit of labour. The stress of a growing population on a shrinking forest area can thus lead to the development of new modes of production under which the forest stabilises and eventually expands. In contrast to the neo-Malthusian approach that predicts agricultural *extensification* leading to forest exhaustion, the Boserupian approach suggested that population pressures may also be capable of driving forest trends to sustainability via agricultural *intensification.*

What this work showed was that the impact of population growth is largely determined

by its interaction with other socio-economic variables. In this context deforestation can be explained for example, as a function of high levels of population growth, but only in conjunction with low levels of economic development and fiscal austerity, which prevent the creation of jobs in other sectors that might relieve human pressure on forests (Dietz & Rosa 1994; York, et. al. 2002). This absence of alternative economic opportunities creates an army of surplus labourers and 'shifting cultivators' who move quickly to acquire and clear marginal lands for cultivation (Myers 1984; 1996; Rudel & Roper 1997). After a few years they move on to new lands, allowing old plots to recover. However, as the pressure of feeding expanding rural populations increases, shifting cultivators allow less time for the land to lie fallow and return to its original state before clearing it again (Ickowitz 2006). Over time, primary growth forests are thus replaced by a patchwork of permanent fields and sparse secondary growth forests.

Demographic pressures may also combine with the availability of land and the prevailing system of land tenure and distribution to determine population density, which creates new pressures to adapt and fosters different forms of response (Bilsborrow & Geores 1994). Moreover, the relationship between population and deforestation trends is mediated not only through demand for food and agricultural land, but other factors such as demand for forest products like fuelwood and timber. It also depends on the indirect effect of other factors such as the supply of cheap labour and the spatial distributions of road networks (Mather et. al. 1999: 6). The current consensus therefore is that population pressures have little explanatory utility when analysed in isolation, and need to be incorporated into models that include relevant co-variables too (York, et. al. 2002; Burns et. al. 2003).

### Urban and rural migration

In line with the agricultural extensification argument, deforestation is usually viewed as the result of population pressures, agrarian techniques and migration to *rural* areas. These effects are exacerbated by structural inequalities and the limited decision making opportunities available to rural populations, with ecological and long term economic concerns receiving lower priority than short term survival and economic gain. Following this logic, any process, such as urbanisation, that removes excess population from rural areas should therefore alleviate some pressures on forests from small scale farming, hunting and fuelwood gathering (Ehrhardt-Martinez 1998). Variations in household

composition can also have an effect, with urbanisation generally resulting in declining birth rates and a disproportionate reduction in the number of young people who perform most of the physically taxing work of clearing primary rainforest in rural areas (Jorgensen & Burns 2007). Patterns of rural-urban migration may also have indirect market effects, such the demand for increased efficiency and the development of alternative resources, further alleviating the pressure on forest resources (Wright & Muller-Landua 2006).

However, other studies have shown that the causal impact of rural-urban migration is not always a one way process, and may be counteracted by the effect that urbanisation has on forests via a greater demand for agricultural commodities. Urban consumers generally eat more processed foods and animal products than rural consumers, creating not just greater overall levels of demand but also changes in consumption patterns (Kennedy et. al. 2004; Mendez & Popkin 2004). The resulting commercialisation of crop and livestock production leads to further land clearance and less sustainable methods of land use. Such studies suggest that the traditional mode of clearing in frontier landscapes for small scale production to support subsistence needs or local markets is no longer the dominant driver of deforestation in many developing countries (Rudel et. al. 2007; DeFries et. al. 2010).

It seems then, that generalisations along the lines of "population growth does/does not cause deforestation" fail to capture the complexity of the processes at play. This literature suggests two possible reasons for this. The first is that traditional drivers of deforestation such as agricultural extensification are changing, and these changes affect the ways in which human societies interact with forests. This makes it more difficult to predict how shifting patterns of population growth and migration are likely to affect deforestation rates via changes in demand for forest lands and resources. The second, and more important reason is that the impact of demographic pressures are mediated via other factors that link humans to forests such as technology, markets and institutions.

Economic and demographic trends in particular are closely related – population data may to some extent act as a proxy for other variables relating to economic development, and therefore reflect influences ranging beyond that of population growth itself (Mather et. al. 1999). This is not to say that demographic factors do not matter; they are obviously still an important variable to consider when thinking about the structural causes of deforestation. However, the call by Marx and Engels to arrive at a deeper understanding

of the social, political, and economic structural conditions within which demographic pressures occur still holds true. In the language favoured by economists demographic pressures are neither a necessary nor sufficient condition for deforestation, and should be thought of instead as just one of an array of forces impacting forests.

## Economic Factors

Given the geographical concentration of global deforestation in developing countries, it is not surprising that most economic analysis to date has focused on the effects of growth and development. Specifically, environmental economists have sought to understand whether a predictable and uniform relationship exists between levels of income growth and deforestation, and if so, whether it is possible to predict future trajectories of forest cover as levels of income change. The formal model around which much of this analysis has been built is known as the Environmental Kuznets Curve (EKC), named after the economist Simon Kuznets (1955) and his work on income distribution theory. Kuznets suggested that income inequality initially increases along with economic growth at low to moderate levels of GDP per capita and then starts declining after a certain point. His theory is encapsulated by the now famous graph showing income inequality as an inverted U-shaped function of income per capita.

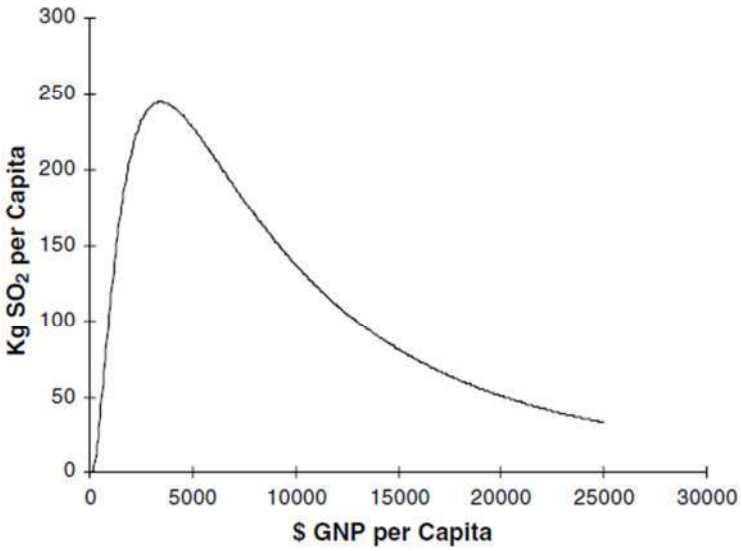


**Figure 8**: The EKC for sulphur emissions.
Source: Stern (2004)

Although both the theoretical and empirical bases for the Kuznets curve were subsequently undermined by a substantial body of research (see Moran 2005: 221-229 for a comprehensive review), Kuznets's basic premise was adapted by a number of environmental economists in the early 1990s to suggest that a similar relationship could be demonstrated between levels of income and environmental quality (Grossman & Krueger 1991; Shafik & Bandyopadhyay 1992). Since then a spate of studies have been

produced that investigate various forms of environmental degradation including air pollution, energy usage, waste production and deforestation (Dinda 2004; Stern 2004). The common assertion tested in this literature is that in the early stages of economic development a nation relies heavily on its environmental capital in order to secure industrial takeoff, resulting in significant environmental damage. Past a certain intermediate level of development though, the exploitation of natural resources becomes less important for growth, reducing strains on the environment and resulting in a shift to a more sustainable growth path.

The EKC is a simple but powerful idea, suggesting that capitalist economies have the potential to grow sustainably. Its implications are profound; if it is possible to prove the existence of an EKC and to understand why it occurs, then it may also be possible to design policies that 'flatten' or 'tunnel through' the income/environmental quality inverted-U relationship. For developing countries this holds out the prospect of avoiding the same levels of environmental degradation experienced by industrialised countries during their early growth phases (Panayatou 1993; Munasinghe 1999). More importantly it provides a sound rationale for the primacy of economic growth as the ultimate developmental goal. If the EKC holds true, then there is no need to enact policies for environmental protection so long as growth continues to a point where environmental restoration kicks in. If policy can be improved so that a more sustainable path to development can be found, then so much the better, but ultimately in an EKC policy framework growth always trumps sustainability.

### The EKC and deforestation

Of the various forms of environmental degradation tackled in the EKC literature deforestation holds a special appeal. This is because it is a) a spatially fixed phenomenon and therefore measurable, b) unequivocally the result of human activity and c) uniquely intertwined with all other aspects of environmental degradation (Ehrhardt-Martinez et. al. 2002: 227). Specifically the hypothesised EKC for deforestation suggests that as developing countries begin to industrialise reliance on natural resources generates increased deforestation via the increased demand for forest products and forest lands. This is facilitated by technological advances that encourage forest clearing and by the expansion of available capital for productive ventures. Eventually though, the associated environmental costs of this process are internalised due to the commercialisation and

mechanisation of agriculture and the development of better and more efficient technologies which raise productivity and thereby reduce demand for cleared land (Radetzki 1992).

Additional processes accompanying this change include the increased use of fossil fuels, a shift to new building materials and the evolution of the economic base from agriculture and manufacturing to more service based activities (Selden & Song 1994; Grossman & Krueger 1995; Ehrhardt-Martinez 1998; Ehrhardt-Martinez et. al. 2002). Populations also migrate from the countryside to cities, further reducing pressure on forests from subsistence agriculture. Finally, development brings with it a growing middle class that places greater emphasis on the non-market value of forests including biodiversity, wildlife conservation and aesthetic values. This is driven by a discursive shift as social norms change to idealise contact with nature and to demand protection of environmental quality, leading in turn to the establishment of environmental organisations, forest reserves and policies promoting improved land management (Selden & Song 1994; Baldwin 1995).

Unfortunately there is little reason to believe that an EKC for deforestation really exists (Barbier 2001; Dida 2004). While a few authors have presented empirical data in support (Ehrhardt-Martinez 1998; Rudel 1998; Mather et. al. 1999) the majority find little or no evidence to back its claims. When tested for all forests (temperate and tropical), large-N cross country studies have generally derived results that are inconclusive or that directly contradict the theory (Shafik 1994; Panayatou 1995; Antle & Heidebrink 1995; Koop & Tole 1999; Meyer et. al. 2003; Culas & Dutta 2002). When applied to regions or countries the evidence seems to hold only in specific contexts. Cropper & Griffiths (1994) for example, find for an EKC pattern for Africa and Latin America, but not for Asia. Their hypothesized EKC transition points are also so high as to be completely unrealistic; under their scenarios by the time income per capita reached the posited levels, there would be very little environmental resources left to recover.

One possible reason for this is that the disappearance of forests can have adverse livelihood effects for the poorest people in developing countries. This is the idea that forests provide a ‘safety net’ for poor people during periods of hardship or as a cushion against unexpected income shortfalls due to for example, family illness and natural disasters (Wunder 2001; Angelsen & Wunder 2003). The poor will tend to use forests

primarily for NWFPs since they do not have the skills or capital to engage in commercial timber production. Also, growing timber requires secure land tenure which the poor often do not have, and represents a long term, high risk investment (Wunder 2001). The problem however, is that the same factors that tend to make forests important in the livelihoods of the poor also limit the scope for them to lift people out of poverty. The harvesting of forest products is subject to seasonal and annual fluctuations, and the open access nature of many of the forests makes them vulnerable to overexploitation. Markets for NWFPs are also small, and limited access puts producers in a weak bargaining position relative to traders who typically provide transport, market connections and credit to forest product collectors (Sunderlin et. al. 2005).

Other critiques have focused on statistical flaws such as the assumption of a linear and predictable income growth function over time (Arrow et. al. 1995; Stern et. al. 1996). This practice ignores declines during periods of conflict and/or economic crises, which may be short in duration but can have lasting effects on patterns of forest change. There are also significant concerns about the nature of the co-variables used in much of the EKC analysis since these matter as much, if not more than economic growth and income levels (Barbier & Burgess 2001; Ehrhardt Martinez et. al. 2002; Barbier 2004). As with the studies on demographic variables this line of criticism offers an important clue as to the failure of the EKC hypothesis to hold up under close scrutiny. Specifically it shows that income growth alone does not guarantee the required shift in the composition of a country's economic base, nor can it be relied on to bring about the discursive shifts necessary to change the way a society values forest services. Rather, the relationship between income growth and deforestation is governed by complex feedback mechanisms involving multiple institutional channels that affect both market and political forces (Antle & Heidelbrink; 1995).

Rudel (1998; 2005; 2007). has attempted to account for the criticisms levelled at the EKC hypothesis by focusing less on the income effect than on the dynamic causes of the 'forest transition' itself Having observed a familiar pattern of forest decline and then recovery in many industrialised nations, he suggests that two main paths to forest recovery exist. The first is the familiar one outlined by the EKC literature in which existing forests are left alone and remote land is abandoned to revert to its original state as a result of economic development and urbanisation. The second is known as the forest scarcity path in which declines in forest cover spur price increases in the price of forest

products, inducing land owners to plant trees instead of crops or pasture. The suggestion is that this 'transition' can be aided and assisted by well designed government policy to encourage reforestation projects and manage prices. A greater emphasis on the role of policy is also evident in the work of Panayatou (1997) who suggests that the quality of policies and institutions can weaken the effect of the EKC. Such an effect has received empirical support from research by Bhatarrai & Hammig (2001) who test for a relationship between deforestation and the quality of political institutions and find that the internalisation of deforestation costs is brought about not just by the growth of income but also crucially, improvements in institutions that empower citizens through the enhancement of democracy, the strengthening of individual freedom and liberties and the establishment of the rule of law.

### Ecological modernisation

A more critical perspective on the impact of economic factors on deforestation comes from studies that point out how the EKC and forest transitions approaches belong to a larger academic tradition known as ecological modernisation theory (EMT) (Erhardt-Martinez et. al. 2002; Perz 2007; Ozler & Obach 2009). EMT is a view which suggests that the twin goals of economic growth and ecological sustainability are not mutually incompatible. The free market, in conjunction with limited state intervention and civil society support, generates efficiency gains, technological development and the types of social reform required to address environmental problems. The market thus contains its own internal dynamic, one that is best placed to respond to the demands of sustainability – and what is required is the conduct of policy in such a way as to unleash its problem solving potential (Esty & Porter 2005; Jaffe & Palmer 1997; Mol 1997; Mol & Spaargaren 2000; Porter 1991). Via this logic deforestation is viewed merely as the result of a temporary mismatch between technological regimes, population parameters and the social organisation of economic activities, a problem that will resolve itself as soon as true market forces are allowed to align.

The main proponents of EMT go to great pains to point out that the economic dynamics behind environmental reform should not be understood as a deterministic account of technological progress (Mol 2001). It is still a process accompanied by power struggles, standstills and regression. Economic institutions and actors are not self regulating; state backing is always needed to get markets and economic actors moving in the right

direction before market actors can take over (Mol 1997; Mol & Spaargaren 2000; Mol 2001). Political decisions, civil pressure and citizen consumer demand are thus decisive. Nevertheless it is the economic domain that articulates these pressures into outcomes and therefore plays the dominant role. Simply put the idea is, "just get the policy right, and markets will do the rest." The underlying message is that it is possible for capitalist economies to reform themselves to promote environmental goals, and that the agent of this reform should be the market itself (Mol & Sonnenfeld 2000).

However, a substantial critical review by Perz (2007) raises a number of doubts about the general theoretical and empirical validity of EMT, especially as it relates to the problem of deforestation. For a start EMT is not new idea; much of its language is familiar from the work of development economists in the 1950s and early 1960s. Like earlier forms of modernisation theory it is a structural-functional account that employs abstract, universalist arguments that when applied to concrete historical cases, miss many of the important context specific explanations behind development. And like modernisation theory it tends to derive its conclusions from the historical experience of forest transitions in the developed world, ignoring factors such as the experience of colonisation, subordination to foreign actors and export orientation toward external markets (Fisher & Freudenburg 2001).

The prospect of facing many of the old criticisms of modernisation therefore makes empirical confirmation a crucial question for EMT. Yet such confirmation is sorely lacking. Rather, empirical studies tend to reveal two clear patterns. The first lends support to what is known as the 'treadmill of production' theory – a direct counterpoint to EMT's optimism regarding free markets. Far from bringing about increased sustainability, free market activity and the pursuit of profit and economic growth tend to yield greater resource withdrawals and pollution (York et. al. 2003; Ozler & Obach 2009). Within this framework the environmental movement is marginalised and co-opted by the central state and economic actors who determine policy (Ozler & Obach 2009: 85). The second pattern is that the free market appears to operate in such different historical, social and physical contexts as to make the 'grand theory' proposed by EMT meaningless. As Perz (2007: 110) points out, "colonialism, biophysical processes, and strategic action, ranging from the local to the global levels, provide crucial supplements (if not alternatives) to accounts of forest change based on the experiences of advanced industrial countries."

What this literature shows is that as was the case with demographic variables, it makes little sense to try and predict deforestation levels by analysing economic growth alone. This is not to say that growth has no effect – technological progress, increased efficiencies and sectoral production shifts can certainly produce more sustainable outcomes for forests. Likewise there is a strong argument to be made that wealthier and better educated populations do place a higher value on the intrinsic value of forests. However the context specific questions are all important, because economic growth interacts with a number of important variables in order to determine overall impact. The other key conclusion is that deforestation cannot be simply characterised as the result of a temporary misalignment of market forces. The historical record shows that free markets are certainly quite capable of creating unequal and unsustainable environmental outcomes when left to their own devices. This is particularly true when considering the international dimensions of the relationship between economic factors and deforestation.

### Macroeconomic policies

Economic forces and their effects on deforestation do not take place in a vacuum; for most developing countries in the last two to three decades macroeconomic policy decisions have been largely constricted by international factors. In the wake of the debt crisis of the early 1980s for example, a number of developing countries were forced to adopt structural adjustment programs (SAPs) at the recommendation of the Bretton Woods institutions. Successful SAPs were supposed to move developing economies closer to their comparative advantage in primary sectors via investment incentives, credit concessions, tax provisions, agricultural pricing and lease agreements (Repetto & Gillis 1988; Capistrano & Kiker 1992; Thampapillai 1992). They also mandated public sector reforms such as measures to reduce or freeze civil service wage bills and the winding down or privatisation of loss making enterprises (Young & Bishop 1995). Ultimately, the aim was to unleash productive investment and technological change as long term sources of agro-industrialisation (Stiglitz 1987; Jaeger 1992).

With regard to deforestation it was argued that these reforms, by removing distortions and enhancing efficiency, would reduce material wastage and bring about a more productive and competitive agricultural industry, thereby alleviating pressures on forests from further agricultural expansion. The alignment of relative prices in the entire

economy was expected to eliminate bias, increasing production while alleviating rural migration to urban areas, and greater price stability was supposed to result in better resource management. It was also hoped that in line with the EKC literature higher living standards brought about by growth would increase demand for further efficiency and technology gains, promoting greater interest in and creating more resources for environmental protection (Young & Bishop 1995, Kessler & Van Dorp 1998).

Critics though, have argued that far from achieving these goals structural adjustment undermined sustainability via its promotion of resource depletion in countries that had neither the incentive nor the capacity to protect their environmental commons (Abaza 1995; Munasinghe & Cruz 1994; Scrieciu 2007; Barbier 2000). Increased productivity and export orientation in primary sector activities such as cattle ranching, logging, drilling and mining improved returns to the conversion of forested lands without producing a counteracting effect to mitigate the accompanying levels of deforestation. Structural adjustment also mandated the removal of regulations protecting the commons, and brought about deep cuts in government spending. In such cases, the staff and budgets of environmental departments and organisations were often the first to go (Shandra 2007).

Structural adjustment also had indirect effects on deforestation via attempts to reduce government debt, achieve a realistic exchange rate and correct trade imbalances through devaluation and to remove input subsidies and eliminate price controls through price liberalisation. According to Kahn & McDonald (1994) high levels of debt in many developing countries forced governments to enact policies to meet their next payment of interest or principal, or to sustain positions in negotiations with international lenders for debt rescheduling. Such policies included relying on fuelwood to reduce imports of energy, encouraging the export of timber products and promoting the conversion of forest land to farm land for agricultural exports. While such ‘myopic’ behaviour may have been rational in the short run, they led to unsustainable levels of deforestation in the long run.

### Trade and financial liberalisation

In the wake of SAPs, most developing countries were forced to come to terms with the increasing scale and pace of economic globalisation (Held et. al. 1999). Material changes in production, trade and finance associated with this process heightened pressures on

their governments as well as competition among them as they sought to generate wealth through the attraction of investment by multinational corporations and internationally mobile capital. For most, commodity trade has been the most significant mode of articulation into the global economy, forcing them to further exploit their comparative advantage in primary sectors such as agriculture, logging and mining (Dicken et. al. 2001). However, the impact that these changes have had on deforestation are not immediately obvious.

For example, commercial logging companies and their involvement in the international timber trade are often identified as a cause for concern. Forest products are after all, internationally tradable goods whose price is determined by world markets as well as domestic markets. An increase in international prices for forest products due to an increase in world demand should theoretically result in improved terms of trade for exporting forest countries, creating further pressure via agricultural expansion or excessive logging (Cropper & Griffiths 1994). Evidence on the effect of these changes is unclear though. While markets for timber have certainly become more globalised many of these operations have not led to permanent land clearing, and attempts to estimate the effect of the globalisation of timber markets on deforestation do not reliably predict forest losses (Godoy et. al. 1997; Wunder 2003; Rudel 2007). Analysis suggests that it is not trade itself that is the problem, as tropical timber represents only a small proportion of the world's total supply. As Barbier et. al. (1994) point out, this means that international timber prices do not reflect the increasing scarcity of tropical forest resources.

A more convincing critical argument about the effects of trade liberalisation is represented by the theory of 'unequal ecological exchange' (Jorgensen 2006). In less developed countries economic activity is centred around agriculture and livestock, extractive processes and export oriented production (Jorgensen 2003; McMichael 2004; Jorgensen 2006). This is in part due to natural resource endowments and the historical legacies of colonialism, but is also illustrative of the outsourcing of production from developed to developing countries via the broadening and deepening of global commodity chains and the transnational organisation of production (Gereffi 1999; Robinson 2004; Wallerstein 2005). Trade blurs responsibility for the effects of consumption and production by allowing developed countries to partially externalise their consumption based environmental costs to less developed countries, which experience an increase in forms of environmental

degradation as a result (Lofdalh 2002).

This 'vertical flow' of raw materials and produced commodities from less developed to developed countries is maintained by the continued emphasis of trade liberalisation reforms on the promotion of export led growth. This is why in developed countries, economic development and less deforestation usually go hand in hand. This is the consumption/environment paradox identified in the 'forest transitions' literature. However this is not due to internal market dynamics as argued by proponents of modernisation theory but rather increased cross border movement of goods and services in a globalizing world (Jorgensen 2006; Jorgensen & Rice 2005). A number of cross national studies find support for this idea by showing that higher emphasis on primary sector exports are closely associated with deforestation (Bunker & Ciccantell 2005; Rudel 2005; DeFries et. al. 2010) and that countries with higher levels of exports sent to more developed countries experience more deforestation relative to others (Jorgensen 2003: Jorgensen 2006; Jorgensen & Rice 2005).

This type of commodity trade, the most important form of access to the global economy for developing countries, is mostly organised by MNCs. These firms have gradually become transnationally organised and globally distributed, helped by lowered shipping and transportation costs and the expansion of international trade (Dicken 1998). According to neoliberal economists MNCs are supposed to be catalysts for sustainable development because they employ newer technologies and more advanced management practices, increasing efficiency and spurring innovation. This results in the manufacture of products that are less environmentally damaging. MNCs are also assumed to contribute to better environmental practices through the transfer of better managerial skills not available to host countries (Gentry 1998).

However the balance of evidence suggests that foreign firms are far more likely to create pollution 'havens' than 'halos'. They invest in highly polluting and less eco-efficient forms of manufacturing processes, transfer out dirty technology, disregard local laws, follow poor environmental practice and perpetuate technological dependence rather than disseminating knowledge (Zarsky 2002; 2006; Abdul-Gafaru 2006). At the same time economic globalisation has heightened competition amongst countries as they seek to generate wealth through the creation of more favourable business conditions and the lowering of environmental standards and regulations for extraction and production

(Schofer & Hironaka 2005; Clapp & Dauvergne 2005; Jorgenson et. al. 2007). The more central the role of foreign investment in promoting growth and employment, the greater the constraints of investment governance for less developed countries, with worries about the perceived threat of flight giving host countries added incentives to offer regulatory concessions. Absent obligations and given foreign investor biased norms and a high degree of economic globalisation, the result is what Zarsky (2006) calls 'regulatory chill.'

The problem of course is that the poorest countries are also those with the least regulatory capacity and the weakest institutional safeguards against deforestation. Ewers (2006) for example, suggests that the ability of nations to reduce their levels of deforestation depends on two variables – the quality of government and the money available to that nation for investment. Weak governments are more likely to permit ongoing conversion of forests to other land uses as an alternative to the problem of dealing with land reform, and individuals are more likely to be able to exploit forests for personal gain. Sure enough, there is consistent evidence to suggest that developing countries have lower environmental standards than developed countries (Morimoto 2005). In the forest sector these include tax holidays, exemptions on log harvest quotas, clear cutting, logging protected species and logging in protected areas (Shandra et. al. 2008).

Some authors have summarised these various factors as indicative of the ever growing dependence of the world's poorer countries on rich countries (Burns et. al. 1994 1997; 1998; Kick et. al. 1996). An international hierarchy of unbalanced economic exchange relations is entrenched via market logic and the global accumulation of capital, centred around the concentration of exports in the primary sector and the activities of MNCs and international financial institutions (Wallerstein 1974; Bornschier & Chase-Dunn 1985; Bunker & Ciccantell 2005; Chase-Dunn & Jorgensen 2003). Gains for one country dictate losses for other countries, and less developed countries become peripheralised in the world economy as they are exploited by interests in the core. Due to world systems impacts national deforestation rates will thus differ cross nationally in systematic ways, with different consequences depending on whether a country is part of the core, semi-core, semi-periphery or periphery (Shandra 2007; Shandra et. al. 2008).

This lack of regulation has contributed to a shift to what Rudel et. al. (2007) call

'enterprise driven' deforestation. They describe how plantation owners, large scale soybean farmers and livestock ranchers have expanded their enterprises in response to increasing demands from local and national urban markets in the last two decades. To facilitate their plans for expansion large landowners, aided by local politicians and bankers, have lobbied federal and provincial governments to enact policies designed to promote agricultural expansion at the expense of forests. The authors conclude that "the growing influence of coalitions of agribusiness proprietors and the continued depletion of forests by rural enterprises serving urban consumers both attest to the important role that private enterprises played in destroying (...) forests during the 1990s" (Rudel et. al. 2007: 40).

## Governance and institutions

Studies on the relationship between deforestation and the institutional and governance contexts in which it takes place are a relatively new phenomenon. This can be attributed in part to the tendency of social scientists, and particularly economists, to look for generalisable models and easily quantifiable measurements of structural causes, with little consideration for the different social and political conditions in countries where deforestation takes place. However it is also because the problem is a complex one; the question of how forests should be managed, by whom and for whose benefit requires answers at levels from the global to the local (Hobley 2007; Deitz et. al. 2003).

Moreover, even where solutions exist, they are provisional and subject to ongoing revisions as a result of demographic and economic shifts, different developmental processes and changes in political landscapes and scientific and policy discourses, among other variables (Agrawal 2007). This is not to say that institutional analysis has been completely ignored – for example, an impressive body of literature has emerged that looks at the different approaches to governing forests as common pool resources. However as Shandra (2007: 543) points out, "most efforts to understand the relationship between governance, institutions and deforestation have thus far tended to be too eclectic and have largely failed to build upon existing cross national research to specify the different external contexts in which different governance factors play a role."

### Types of political regime

At the national level analysis of the relationship between institutions and deforestation has focused mostly on types of political regimes. From a certain viewpoint it can be argued that modern liberal democracies suffer from a number of structural characteristics that prevent them from tackling environmental challenges such as deforestation. These include short term decision making based on electoral cycles, self-referring decision making that ignores externalities and cross border spillover effects, and greater interest group concentration and pluralism that caters to narrow interests and leads to a gridlock in public decision making (Held & Fane Hervey 2009). These shortcomings have led to concern about the compatibility of democratic governance with the need for the type of actions required to deal with environmental challenges. Such thinking finds its historical precedent in the work of the 'eco-authoritarians' of the 1970s,

who argued that it is difficult in democracies to constrain the damaging pressures of economic activity and population growth on the environment. They suggested that some aspects of democratic rule would have to be sacrificed to achieve sustainable future outcomes since authoritarian regimes are not required to pay as much attention to citizens' rights in order to establish effective policy in key areas (Hardin 1968; Heilbroner 1974; Ophuls 1977).

Such thinking has been subsequently undermined by a body of theory arguing that there are a number of reasons why democracies are more likely than authoritarian regimes to protect environmental quality (Holden 2002). Democracies have better access to information with fewer restrictions on media and sources of information and greater transparency in decision making procedures (Payne 1999). They also encourage scientific research and the exchange and dissemination of new evidence, which is responsible for our awareness about different forms of environmental threat in the first place (Giddens 2008: 74). Concerned citizens can in turn influence political outcomes not only through the ballot box but through pressure groups, social movements and the free media – channels that are closed in autocracies (Payne 1995). Finally, there are many examples of cases where environmental interest groups have been able to overwhelm business interests pursuing environmentally damaging practices and of cases where they have changed the public agenda (Falkner 2007; Bernauer & Caduff 2004).

At the same time authoritarian regimes have fewer incentives to adopt or stick to sustainable policies. Environmental concerns are often trumped by economic development plans and external security (Porritt 1984), and those in power control a substantial fraction of society's resources, encouraging payoffs to a relatively small elite (Bueno de Mesquita et. al. 2003). Given their insecurity of tenure in office dictators can be expected to have high discount rates which favour allocation of resources at present at expense of the future (Dida 1997). Leaders are also unaccountable to the public, giving them even less incentive to enact long term policy (Congleton 1992). In democratic countries there are structures and institutions which curtail the extent of these behaviours. These kinds of checks and balances either do not exist in autocratic countries or where they do, are usually ineffective (Dida 1997).

Empirical findings on the relationship between types of political regimes and deforestation are inconclusive. While Li & Reuveny (2006); Mather et. al. (1999) and

Dida (1997) find support for the idea that more democracy results in less deforestation, Ehrhardt-Martinez et. al. (2002) and Midlarsky (1998) find no evidence of a significant effect. Part of the reason might be due to the different types of transmission mechanisms that translate policy commitment into policy outcomes. Battig & Bernauer (2009) for example, find that while the effect of democracy on political commitment to environmental protection is positive, the effect on policy outcomes is ambiguous. They observe that the causal chain from scientific knowledge about environmental risks to public perceptions of such risks, to public demand for risk mitigation, and from there to policy output, is shorter than the one leading from policy output to policy outcome. The result is that democratically elected officials respond quite well to public demands for environmental protection but tend to discount implementation problems, hoping that voters will not be able to identify these within a short enough time period to use their votes as a punishment for their failure to deliver.

### Land tenure and property rights

Other research has focused on the role of institutional arrangements governing forest tenure. This refers to the combination of legally or customarily defined forest related rules that define who can use what resources, for how long and under what conditions (Barbier & Tesfaw 2012). Much of this work is modelled around the idea that conserving forest to yield long term sustainable outputs is an investment decision, with the security of property rights affecting the magnitude of investment and the efficiency with which inputs are allocated (Keefer & Knack 1995; Jindal et. al. 2011; Sandbrook et. al. 2010, Campbell et. al. 2008). 'Investors' such as local users, commercial companies and government actors will not forego current consumption without assurance that such a sacrifice will yield future benefits. This assurance is normally in the form of a legal contract or the force of reputation.

However when legal and political institutions are volatile or predatory, owners are exposed to the risk that their parcel of land will be invaded by squatters, harvested by a timber company or confiscated by a government official. This diminishes their incentive to invest and causes forest users to extract and sell forest goods as fast as possible, or to clear land in order to establish legal claims (Deacon 1994; Southgate 1998; Kaimowitz et. al. 1999). According to Deacon (1994) insecure property rights arise when governments lack power, stability and popular support to enforce property laws. Weak and unstable

governments are incapable not only of acting as a guarantor for private resources, but also of preventing free access to resources on government owned land. Furthermore if government institutions are short lived, investment in government owned assets is not a good idea; leases to harvest from government forests are of too short a duration and too subject to uncertainty to provide enough incentives to conserve their long term economic value.

Ownership security is also weakened by the absence of accountability in countries governed by the rule of individuals and dominant elites. In such cases property claims, taxation and regulation may depend on cliques and systems of patronage rather than a predictable set of political and legal institutions. By implication then, improvements in the quality of political institutions and governance should result in a corresponding decrease in unsustainable levels of deforestation This argument has been made by Bhattarai & Hammig (2001), who find that improved governance, measured via indices of political rights and civil liberties, reduces pressure on environmental resources and leads to better conservation of forest land. Culas (2007) focuses on additional factors such as the enforceability of contracts by governments and the efficiency of government bureaucracies and finds for a similar effect.

A related line of research has found a strong association between institutional corruption and deforestation and (Dauvergne 1997; Barbier, et. al. 2005; Smith et. al 2007; Koyuncu & Yilmaz 2009). While laws may designate large tracts of forested land as reserves, regulations are often circumvented by entrepreneurs who pay government officials to give them free rein in extracting resources. Corruption activities can take the form of illegal contract approval for private enterprises, the under pricing of wood, harvesting of protected trees, smuggling of protected products and allowing logging without licenses. The forestry sector is also more prone to illegal activities and corrupt acts than other sectors due to high rents, low visibility, low salaries of government officials, non-standardized products and the broad discretionary powers of local forestry officers (Rose-Ackerman 1997; Koyuncu & Yilmaz 2009).

### Participatory approaches to forest governance

Much of the concern about the world's environmental commons in general and the problem of deforestation in particular can be linked to the work of Garrett Hardin

(1968). He suggested that two factors were driving environmental degradation: the human need for resources, and the way in which we organise ourselves. Using the example of a common grazing ground, he pointed out the effect of each herdsman pursuing a rational course of action by grazing more and more of their cattle. "Therein," he concluded, "is the tragedy. Each man is locked into a system that compels him to increase his herd without limit – in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all" (Hardin 1968; 162). Accordingly Hardin advised that only two institutional arrangements could liberate resources from this 'tragedy of the commons' – full government control or privatisation.

Pioneering work by Ostrom (1990) and Ostrom, et. al. (1994) however, criticised Hardin's taxonomy for being too simple. They showed that commons users were not hopelessly trapped in the continued overuse of resources by highlighting the important differences between the public and private management of what they called 'common pool' or 'common property' resources (as opposed to Hardin's 'open access' resources). Common pool resources are those for which it is costly to exclude others from use but for which the use of the resource is subtractable; that is, one user's harvesting diminishes what is left for others to harvest (Ostrom 1990). The design of traditional property rights arrangements for such types of resources can create incentives for grievous depletion rather than sustainable use, whereas the characteristics of resources and social interactions in many subsistence societies present favourable conditions for the evolution of effective self-governing resource institutions.

Empirical studies have subsequently showed that all types of ownership regimes – private property, common property and government property – are compatible with improvements, declines and stability in forest conditions (Dietz et. al. 2003; Gibson et. al. 2002; NRC 2002). Of these, common property arrangements in particular have received a lot of attention, with the literature broadly agreeing that four clusters of variables are relevant to the successful governance of the commons (See Agrawal 2001; Gibson 2001; Ostrom 2001; Dietz et. al. 2003, Gibson et. al. 2005; Agrawal & Gupta 2005; Agrawal 2006). These are the characterics of the resource system (such as size and boundaries); user group characteristics (such as the size of group, whether group boundaries are clearly defined, the degree of group heterogeneity, levels of trust among users, level of dependence on the resource and original endowments); institutional

arrangements (such as rules for access, usage and enforcement) and the external environment (including the actions of state and non-state actors and demographic, cultural, technological and market related factors at the local, national and global levels).

Viewed as a whole this literature suggests that there is no simple recipe or optimal design for local institutions to effectively limit deforestation (Deitz et. al. 2003; Ostrom 2005). Forests occur in a wide variety of physical and ecological settings, with different sizes and boundaries. Given the different characteristics of the groups that use them and the variety of different external factors that influence their decisions, rules that work well to facilitate collective action for one group may not work well when used by others. Differences both within and between user groups allow some to ignore the established rules of commons use or to reshape the rules in their own interest (Dietz et. al. 2003). The challenge is therefore to move beyond the simple presumption that there is one or a limited set of institutions that work to solve all commons dilemmas and to sort out which factors are most important in achieving successful management in particular settings (Gibson et. al. 2005). The literature also suggests that there are productive avenues of research and dialogue between those who focus on external factors as critical influences on local forest governance and those who focus primarily on community institutions themselves (Agrawal 2007).

The increased attention to common pool resource management can be thought of as part of a growing institutional preference for the decentralisation of forest resource management. Decentralisation can be defined as any political act which involves a transfer of powers from central government to lower level actors and institutions. It generally takes one of two forms – devolved governance to lower layers of government, or a transfer of management rights to local communities (Andersson et. al. 2004). Most analysis on the decentralisation of forest governance has focused on this latter type, in combination with the new ways of thinking about local governance arrangements as advocated by common pool resource management scholars (Agrawal & Ribot 1999; Andersson & Gibson 2007; Agrawal et. al. 2008).

The traditional view is that decentralisation is expected to lead, under the right conditions, to improved efficiency, equity and responsiveness to citizen demands. Local users are assumed to have better information about local conditions and preferences,

leading to better targeted policies and lower transaction costs. Efficiency is further increased via the consolidation and internalisation of costs and increased competition among jurisdictions (World Bank 1997). Decentralisation is also a means of increasing downward accountability, thereby institutionalising and scaling up popular participation (Agrawal & Ribot 1999; Ribot 1995). This makes greater use of the capacity of local users to identify and prioritize environmental problems more accurately. Local groups are also more likely to respect locally generated rules, making resource use monitoring easier to conduct (Ribot 2002; Larson & Ribot 2004; Ribot et. al. 2006).

According to Agrawal (2012) as a result of decentralisation reforms undertaken by governments in the Global South, forest area under community governance has increased from 200 million ha in 1980 to 450 million ha today. Another study by Sunderlin et. al. (2008) has shown that the percentage of the global forest estate designated for use or owned by local communities and indigenous peoples increased from 9.2 per cent to 11.4 per cent between 2002 and 2008, and that the proportion of forests under community management are now equivalent to those under conservation in public protected areas. This is occurring because central governments are under pressure from a number of sources to extend rights over their natural resources. These pressures include fiscal deficits, aid from international donors that is conditional upon local participation, pressures from communities and indigenous groups for greater control over their lands and evidence that local actors have the capacity to protect and use forest resources sustainably and at lower costs than government agencies (Lemos & Agrawal 2006; Agrawal 2012).

Increasing globalisation and the search by international finance for lucrative opportunities further increases pressure at the local level for equitable resource access; this is particularly true in Africa, where governance institutions are weak and national economies are dependent on a rich natural resource endowment, and where conflict and political instability are fuelled by attempts to control access to resources (Hobley 2007). However it is an open question whether such changes have translated into better resource conditions. One problem is that the necessary institutional arrangements are rarely observed or when they are, have serious design flaws and a marked lack of accountability (Agrawal & Ribot 1999). They have also encountered strong resistance from central governments who regardless of rhetoric, policy and legislation, erect imaginative obstacles in the path of decentralised institutions (Agrawal 2001; Ribot

2002; 2003; 2004; Ribot & Larson 2005).

Others have suggested that the problem lies not with the failure to properly implement policy but with the policy rationale itself (Tacconi et. al. 2006). For a start, decentralisation is supposed to improve governance by scaling up local representation and greater community involvement. However many countries have weak representative institutions and representative decision making processes, and local authorities and vested interest groups can manipulate institutions and opportunities created by decentralisation for their own benefit. Only when they reap political and financial rewards are local politicians interested in investing time and resources into forestry activities (Andersson et. al. 2004). Depending on which interest group demands are stronger, and the level of government support and supervision, decentralised policies also create different patterns of incentives that help determine degree of success. Where incentives are skewed local politicians favour short term private benefits such as kickbacks from timber concessions over long term goods such as protection of soil fertility, control soil erosion, safeguard water supply and ensuring a stable source of forest products (Andersson & Gibson 2007).

Another problem with participatory approaches is the presumption that the devolution of management to the local level must be better both in social and ecological terms to that of management under state control. As Hobley (2007: 12) points out, perhaps one of the reasons for this is that the origins of the community based natural resource movement did not emerge from a pro-poor agenda but from a strong anti-state position. It may also partially stem from the romanticised view that traditional communities always live in harmony with natural resources (McCay 2001). However as Tacconi (2007) suggests, policymakers should investigate the real level of benefits and the associated choices people in rural communities actually make about whether to conserve forests or not. Outcomes depend on range of conditions including benefits derived from alternative land uses such as annual and perennial crops. Likewise, forests may not do much more than act as a 'safety net' for the rural poor, and are therefore less likely to be prioritised in local poverty reduction efforts (see also Wunder 2001).

Even if the ideal decentralisation model was implemented then, it appears forest conservation would not necessarily follow. The advantages and disadvantages of transferring control over resources to communities are therefore better considered

within whatever paradigm of locally based resource management is most appropriate, e.g. co-management, joint forest management, common pool resource based management or private access and property rights. These resource management systems can in theory, take place in either politically centralised or decentralised states. These conclusions are remarkably similar to those reached by researchers looking at common pool resource management, who suggest that successful institutions depend on a number of context specific factors rather than one or a limited set of institutional policies.

### International institutions

Forests may be affected by institutional arrangements that operate across state borders. Such institutions provide various mechanisms for environmental governance and influence the social and political contexts in which national and local efforts at forest management take place, even if they are not designed with that intent (Dietz et. al. 2003). According to Dingwerth (2008: 11) these governance processes, "appear to resemble international regimes – with the important difference that it is not states but non-state actors who generate both the principles, norms, rules, and decision making procedures and the expectations associated with them. Hence, we might speak of transnational regimes that have emerged in many areas where international regulation is either absent or weak."

In recent years certification schemes have emerged to become an important mechanism for standard setting and governance in the environmental realm (Auld et. al. 2008). These are market based initiatives fostered by private and semi-public organisations and entities to assure compliance with social, economic and environmental sustainability principles (Cashore et. al. 2004; 2007; Overdevest & Rickenbach 2006; Rametsteiner & Simula 2003).This move towards private regulation is symptomatic of a more general trend in global environmental governance (Falkner 2003; Pattberg 2005). It can be attributed to the spread of new problems beyond the ability of the individual states to manage, the emergence of new private, non-governmental and civil society actors and a change in their capacity to act, and accountability deficits of more traditional forms of global policy making (Benner et. al. 2004; Reinicke 1998; Chan & Pattberg 2008).

In addition to promoting private voluntary initiatives, non-governmental and civil society actors can have an impact on forest management in developing countries via a variety of

other methods (Shandra 2007). They can influence the normative impact of international environmental treaties by raising awareness and can monitor compliance by governments by pointing out embarrassing failures and hypocrisy (Friedman et. al. 2005; Keck & Sikkink 1998). Governments are thus squeezed from both above via international compliance pressures and from below, via local community advocacy efforts (Schofer & Hironika 2005). NGOs can also support problem solving initiatives at the sub-governmental level by providing funding, technical assistance and organisational and facilitative support. However, NGO initiatives in this area have been criticised for being ad hoc and limited in scale and geographical scope. Such problems are exacerbated by NGOs' 'go it alone' attitude, and competition amongst agencies to secure funding can result in unintended and potentially negative consequences (Shandra 2007). NGOs also tend to be paternalist and reformist, advocating programs and policies designed to alter the political status quo while being unaccountable to local populations (Bryant & Bailey 1997; Powell & Seddon 1997).

At the international level efforts to create a global convention to stop deforestation have existed since the United States first proposed one in preparation for the 1992 United Nations Conference on Environment and Development (UNCED). The outputs of these negotiations were limited to two pieces of 'soft' international law: a non-legally binding statement commonly known as the 'Forest Principles', and Chapter 11 'Combating Deforestation', of Agenda 21. In 1995 negotiations on a global convention began again with the creation of the Intergovernmental Panel on Forests (IPF), a sub-group of the Commission on Sustainable Development (CSD) which later became the Intergovernmental Forum on Forests (IFF) in 1997. At the end of its lifespan in 2001 the IFF forged a consensus around the creation of a new UN body, the United Nations Forum on Forests (UNFF), which in turn negotiated the Non-Legally Binding Instrument on All Types of Forests (NLBI) in 2007. Unfortunately despite this impressive roster of meetings and negotiations, the international community has not yet managed to create a legally binding agreement on forest management and to date there is no 'hard' international law on forests. All the legal outputs on forests that have been negotiated such as the UNCED forest principles, the IPF and IFF proposals for action and the NLBI, are non-legally binding (Humphreys 2005).

Various interpretations of this process are available. An institutional perspective, which views policy success or failure on the basis of the effectiveness of norms, conventions,

procedures and laws in achieving a desired outcome, suggests that efforts to achieve effective forms of global forest governance have failed due to the continued inability of states to reach a legally binding international agreement (Humphreys 2005; Dimitrov 2005). By contrast, ideational, constructivist and interpretive perspectives suggest we are seeing a marked change in global forest policy arrangements on the basis of discursive changes (Elands & Wiersum 2001; Bengston et. al. 2005; Selby et. al. 2007). Concepts of sustainability are now firmly rooted in policy discussions and deforestation and forest degradation are now framed in terms of biodiversity loss and climate change, offering strong hope for policy innovation, management change and sustainability effects on the ground (Arts & Buizer 2009).

Arguably the most significant recent international institutional development for the future of forest management though, has occurred via international negotiations on another global environmental issue: climate change. In the last few years a global market for carbon offsets has been created via the demand for and supply of carbon reductions that can be priced and exchanged under either the international climate regime created under the Kyoto Protocol or the parallel voluntary market. Under the Protocol, provision is made for transfers from Annex 1 (developed) to non-Annex 1 (developing) countries in the form of the Clean Development Mechanism (CDM). The CDM allows for the sequestration of emissions from *afforestation* (the planting of trees on land that has no history of forest cover) and *reforestation* (the planting of trees on land that has been previously forested). Crucially though it has no provisions to allow non-Annex 1 countries to receive credit or payments for avoiding deforestation. Many argue that while rewarding afforestation and reforestation is appropriate for most developed countries currently experiencing forest stock gain, avoided deforestation seems relevant to measure 'additionality' in most tropical countries where deforestation is the major concern (Barbier & Tesfaw 2012, Adhikari 2009, Wunder 2006).

Accordingly, at the Bali Conference of Parties (COP13) at the end of 2007, countries agreed to create a mechanism for 'Reducing Emissions from Deforestation and Degradation' (REDD) as a potential component of a post 2012 climate change regime. The following year, inspired by concerns that focusing exclusively on deforestation and degradation could encourage bad behaviour, a '+' was added to denote the inclusion of the role of conservation, sustainable management of forests and enhancement of forest carbon stocks (Cronkletin et. al. 2011). The UN-REDD+ Programme became

operational in September 2008 with a US$75 million budget and potential funding of US$4 billion. It currently supports countries in two ways: via direct support to the design and implementation of UN-REDD National Programmes and via complementary support to national REDD+ action through common approaches, analyses, methodologies, tools, data and best practices. As of July 2012 total funding for these two streams of support totalled US$117.6 million (UN-REDD+ 2012).

However, there is considerable controversy surrounding current proposals for REDD+. A central question is whether forest conservation should be financed through a market based trading system for forest carbon credits (based on the current CDM model), through a separate fund drawn from either dedicated tax revenues, proceeds from GHG emission allowance auctions, voluntary government contributions or via a combination of all of these (Bosetti 2009). The current consensus seems to be that the qualified success of carbon trading platforms like the European Union Emissions Trading System (EU-ETS) demonstrates the feasibility of relying on market based financing approaches (Lu & Liu 2012). There are also serious concerns around how REDD+ would actually work. Recent research by Romijn et. al. (2012) for example, reveals that the majority of non-Annex 1 countries have insufficient means to monitor their forest cover and carbon stock. In general capacities are less well established for carbon stock measurement than for measuring forest area change.

Developing countries are also concerned about sovereignty issues, fearing that allowing credits for avoided deforestation could result in the 'buying up' of their forests, thereby constraining their economic growth and development goals (Phelps et. al. 2010). Other research has pointed out that the success of REDD+ will depend on compensation terms and forest tenure (Westholm et. al. 2011; Barbier & Tesfaw 2012). The fact that REDD+ activities are likely to be led by governments means that decisions about how local communities will be involved remain within the purview of the central state. Even when national governments choose to involve local communities, REDD+ schemes are therefore likely to be regulated by national rather than customary law, which may impact significantly the extent to which customary tenure systems are recognized and protected under national legislation (Barbier & Tesfaw 2012; Cotula & Mayers 2009). Where tenure security over forest is weak, REDD+ can pose a risk for forest communities, who could be dispossessed, excluded and marginalised (Barbier & Tesfaw 2012; Sandbrook et. al. 2010). Finally, there are concerns that REDD+ will not encompass broad ranges

of desired outcomes. For example, many have warned that a carbon market for avoided deforestation may adversely impact biodiversity and other forest ecosystem services (Phelps et. al. 2011). There are also concerns that the focus on tropical forests or peatlands, which tend to hold the most carbon, ignore the importance of the ecosystem services provided by wetlands and other types of forest. Accordingly, while avoided deforestation offers a unique opportunity for mitigating the effects of climate change, achieving it on the scale required is likely to be an untidy and difficult business.

| Type of explanation | Structural cause | Description |
|---|---|---|
| DEMOGRAPHIC FACTORS | Population growth and density | Overall impact determined by interaction with other factors. Empirical evidence is inconclusive. |
| | Migration patterns | Overall impact determined by interaction with other factors. Empirical evidence is inconclusive. |
| ECONOMIC FACTORS | Income growth | Overall impact determined by interaction with other factors. EKC literature suggests 'forest transition' past certain levels of income. Empirical evidence is lacking. |
| | Economic liberalisation | Direct effect via the improvement of returns to conversion of forested lands without producing a counteracting mitigating effect. Indirect effect via changes to government debt, exchange rates and trade balances. Empirical evidence is inconclusive. |
| | Poverty | Direct effect on deforestation due to use of forests as 'safety net'. Causality runs from the poor to forest dependence. Empirical evidence confirms this. |
| | Trade and investment | Direct effect on deforestation via the outsourcing of environmental degradation to multinational companies. Empirical evidence confirms this. |
| GOVERNANCE FACTORS | Political regimes | Effect is unclear. Both authoritarian and democratic regimes supposed to improve environmental outcomes. Empirical evidence is inconclusive. |
| | Land tenure and property rights | Direct effect via the creation of incentives to conserve forests for long term sustainability. Quality of institutions and strength of rule of law determines overall impact. Empirical evidence confirms this. |
| | Participatory forms of forest governance | Devolution of forest governance to communities results in greater forest conservation. Empirical evidence confirms this. |
| | International institutions | Effect is unclear. REDD+ is potentially significant for forests however, there are significant concerns over monitoring, sovereignty and impact on communities. Empirical evidence is inconclusive. |

**Table 6**: A summary of the literature on structural causes of deforestation

## Conclusion

First impressions of this literature suggest a large array of different causal patterns. The sheer volume can be quite overwhelming. In designing a comprehensive analysis, there may be as many as 20 to 30 distinct factors which could be factored as potential variables. One of the major challenges for the scholar therefore, is to create an appropriate conceptual framework. In this review, I have categorised the different structural causes of deforestation under the headings of demographic, economic and governance factors. These are summarised in Table 1, on the preceding page. However, I have created this summary with the full knowledge that many of these factors tend to operate in messy and complicated ways, and may fall under more than one category. This is why it is important to make sure that each category of causes is not analysed in isolation.

I am also aware that there is more than one way to conceptualise this problem – others, such as Geist & Lambin (2001) for example, have covered the role of technology related factors such as agrotechnological change, applications in the wood sector and agricultural production factors. However, I have chosen not to include technology factors in this analysis for two key reasons. The first is that I consider them to be a component of factors that have already been included in this conceptual analysis, such as agricultural intensification or ecological modernisation. This is not to say that technological change does not have an impact on forests. Rather, I would argue that it is more likely to do so as a result of changes to deeper, underlying socio-economic conditions. In this sense, technological change can be thought of as endogenous to this particular conceptual model.

The second reason for not including technology as a potential structural cause of deforestation in this model is that for most of the miombo countries, the proximate causes of deforestation require only very basic technologies. For example, as I show in Chapter 4, most deforestation in Zambia and Mozmabique is the result of subsistence style agriculture, clearance of forests for charcoal using hand tools, and the setting of fires. All of these activities require little technological input, and the methods have remained largely unchanged for the last 50-100 years. In this sense, technology (or the lack of it) can be thought of more appropriately as a function of economic development in these countries, rather than as an independent factor in its own right. This means that not only is technology difficult to isolate as an explanatory variable, but it also has a

minimal effect in the two countries under investigation. It therefore offers little useful insight into why these two countries are experiencing different rates of deforestation.

Keeping all of these caveats in mind, there are some important lessons to take away. The first is that our intuitions about deforestation are no guide for what happens in reality. For example, the link between population growth and natural resource degradation seems to be an obvious one. Yet as this literature review has shown it does not always necessarily result in deforestation and in some cases, may reduce it. Similarly, even a cursory investigation shows that romanticised notions of sylvan, nature communing, local communities bear little resemblance to the realities of daily life for most people that rely on forests for their livelihoods. Local forest users are just as likely to behave in short term and unsustainable fashions as the shareholders of logging companies or urban consumers. This depends of course, upon the context in which those decisions are made. In trying to understand and properly diagnose the structural causes of deforestation in developing countries at both the national and sub-national levels, the analyst therefore needs to go beyond lazy characterisations or generalisations and avoid relying on popular knowledge or intuition.

The second lesson is that the analyst cannot simply take large scale demographic, economic and political phenomena and predict how these are likely to impact deforestation without first taking into account a host of other criteria. In this sense, conclusions about the impact of a particular variable are almost always likely to be context specific. That said, some general patterns appear to be discernable – population growth need not always equal environmental degradation, there is no reason to expect that an EKC for deforestation exists, and leaving forest conservation to market forces is unlikely to produce sustainable outcomes. Another related lesson is that it is often necessary to disaggregate each of the broad causal categories into their respective components. Population growth has both rural and urban components, economic factors include both domestic and international market forces, and different types of institutional arrangements exist at different levels of analysis.

Finally, the common thread running through most of these arguments is that institutions appear to mediate both the enabling and constraining effect of population pressures, economic growth and markets, defining their impact and generating distinctive policy patterns. The existence of certain types of institutional arrangements, such as the strong

enforcement of property rights and openness and transparency, appears to partially mitigate many of the worst effects of deforestation, while for others, such as global forest governance or local common property resource management, the effects are less certain. In sum, the literature suggests that deforestation depends not only on structural causes such as population growth and income but also, crucially, on governance arrangements and the institutional contexts in which they occur. What is clear is that these arrangements deserve closer attention when thinking about the design of environmental policies affecting the forest sector, and that further empirical work is required in order to better understand this aspect of the problem.

In closing, it might be useful to leave off with where this chapter began, by returning Jared Diamond's account of the lost civilisation of Easter Island. At first glance, this might appear to be exactly the kind of thinking which this chapter has warned against. However, upon closer reading, the message becomes a little clearer. Diamond does not suggest that it was uncontrolled population growth or a finite supply of resources alone that spelled the demise of the Easter Islanders, but rather, the effects of these factors in conjunction with their societal practice of inter-tribal warfare and their inability to recognise this problem and solve it in time to save both their forests, and eventually, themselves. It is a lesson that serves as a timely reminder to those concerned with the causes and consequences of deforestation in the modern era.

Figure 9: Railway between Beira and Inhaminga, Sofala Province, Mozambique. *Image by author.*

# 3

# Methodology

*"Always watch where you are going. Otherwise, you may step on a piece of the Forest that was left out by mistake."*

Winnie the Pooh

In the first chapter of this thesis I identified a crucial yet relatively ignored environmental problem: the miombo woodlands of southern Africa, in spite of their value as a unique ecological area and as an economic resource, are disappearing at an unprecedented rate. Until now research into this phenomenon has failed to adequately specify the structural causes of this problem. Accordingly I established the identification of these structural causes as the central task of this thesis, and defined the key concepts and the key terms of the study. In the second chapter, I went on to identify a few potential answers to the question of what drives deforestation in the miombo woodlands, based on existing theories and empirical research in other countries and regions around the world. I divided these answers into what I called economic, demographic and governance factors, and suggested that amongst them governance was likely to be the key to answering the study's central question.

In this chapter I turn to the task of explaining how I carried out the actual investigation. I begin by making the case for employing a comparative approach to the problem. I suggest that, in spite of some well known drawbacks, the comparative approach offers the best way to achieve both analytical rigour and detailed, case study specific insights. This makes it possible to provide answers to the question of what drives deforestation at both the case (i.e. national) level and regional level, and adds to the general literature on drivers of environmental degradation. I then justify the choice of Zambia and Mozambique as the two country case studies, establishing the analytical framework and the choice of independent and dependent variables on which this study focuses. I explain

why comparing the records of each of these countries offers some possible insights into why certain economic, demographic and governance factors are likely to have a greater effect on deforestation than others, and make clear the assumptions on which the required comparative logic is based. Finally, I describe the actual research design, showing how the fieldwork was carried out and how I acquired the necessary quantitative and qualitative data.

## Choice of methodological approach

Methodological approaches to problems in social sciences are generally divided into one of three main categories – statistical, case study or comparative approaches. There are long standing debates about the particular merits of each, usually corresponding to the participant's preference for quantitative or qualitative analysis. In statistical approaches many cases are studied, with the focus on a limited number of variables which are abstracted and partially removed from the context of the case studies as a means of simplifying assumptions. This method employs formal hypotheses stating universal relationships, makes use of operational definitions and places an emphasis on quantitative data obtained by means of measurement and the use of instruments. These techniques therefore reflect an underlying positivist ontology and epistemology (Faure 1994). By contrast, in case oriented studies a single country or a small number of countries is studied, with the focus on an individual case in its historical specificity and taking into account the total configuration or constellation of factors and conditions. The case is an entity which is thoroughly studied once but in which there is no variation in dependent and independent variables during the period of investigation. This embrace of complexity and the use of 'thick description' rather than statistics in case oriented studies reflect a greater affinity for qualitative interpretations of social science problems (Lor 2014).

The comparative approach is arguably a 'third way,' between the statistical method and case study based approaches, since it employs the experimental logic of the former in conjunction with the qualitative insights generated by the latter. This is the approach adopted by this project. Some authors (e.g. Lijphart 1971; 1975) refer to the technique as 'the comparative method' or the 'comparative cases strategy.' Smelser (1976) refers to it as the 'method of systematic comparative illustration' while Ragin (1987) calls it the 'case oriented comparative method.' It has a rich pedigree, dating back to classic studies by Skocpol (1979) on social revolutions and Weber (1930) on the role of the Protestant ethic in the development of capitalism. The number of cases is usually small – at least two and not usually more than five or six. The deciding factor however is not the number of countries but the method of analysis, first outlined by John Stuart Mill in *A System of Logic* (1843).

Mill described how techniques approximating the scientific method could be employed by social scientists to infer the existence or absence of causality through correlation between a

dependent variable and an independent variable across a small number of cases of social phenomena. When the cases have the same outcome, it is assumed that the independent variable will be the same for all cases, with each of the other variables having some variability across cases. This was what Mill called 'the Method of Agreement.' Its corollary, 'the Method of Difference,' sets up the research in such a way as to explore whether two or more cases differ on an independent variable and on a dependent variable while being similar on at least several other relevant independent variables. When the cases differ in outcomes, then it is assumed that the independent variable will have some degree of correlation with the dependent variable, with all other correlations having lower values.

Critics have argued that attempts to draw general conclusions from the kind of intensive analysis of one or a few cases employed by the comparative approach are flawed by various problems of selection bias, lack of systematic procedures and inattention to rival explanations (for example, Achen & Snidal 1989; Geddes 1990; King et. al 1994). These criticisms stem from the assumption that "every branch of inquiry... if it is not strictly controlled experimentation, has the essential logical function of experiment in inquiry" (Nagel 1971: 452). Since the comparative method employs too few cases for proper experimental control, it is nothing but a poor approximation of more sophisticated statistical analyses (Jackman 1985). Important differences among cases can almost always be identified, and these emerge as possible rival explanations.

Lijphart (1971: 685) succinctly identifies this as the problem of "many variables, small number of cases." The prospective researcher may argue that a particular rival variable is an implausible influence, and justify this with reference to theory or results from previous cases, but this does not suffice as empirical proof. Some degree of covariance between a rival explanatory variable and the outcome therefore requires the juxtaposition of alternative 'similar' cases or conducting more detailed 'within case' analysis (King et. al. 1994; Collier 1999). Even this may not be enough; as Meckstroth (1975: 134) observes, "the basic problem is that the comparative method, as derivative of Mill's methods, provides no criteria to select among the limitless supply of attributes that might be introduced as controls or as explanations for any given phenomenon. Thus, all possibilities are equally relevant as far as the method is concerned, and, as long as an endless variety of possibilities must be considered, the method cannot justify conclusive statements about explanatory relationships."

Another problem, raised by Lieberson (1991) is that those utilising the comparative approach tend to avoid probabilistic thinking either in theory or in empirical applications. This is because in contrast to the probabilistic techniques of statistical analysis required by large-N studies, they attempt to identify causal configurations that necessarily (rather than probably) combine to produce a particular outcome. This requires very strong and therefore often unrealistic assumptions – a deterministic set of forces, the existence of only one cause, the absence of interaction effects, confidence that all possible causes are measured, the absence of measurement errors and the assumption that the same clean pattern would occur if data were obtained for all relevant cases.

In reply, qualitatively oriented scholars have argued there are far greater flaws inherent in statistical approaches, most notably Sartori's (1970) powerful warnings against the problems of conceptual travelling (the application of concepts to new cases) and conceptual stretching (the distortion that occurs when a concept does not fit the new cases). Quantitative analysis can therefore identify general propositions that hold reasonably well across a range of cases, but often fail to explain any particular case well. More recently a number of scholars have also argued that the traditional view that qualitative research cannot identify causal relationships is based on a restrictive and philosophically outdated concept of causality (e.g., Shadish et. al. 2002; Maxwell 2004b; Lieberson 2005). They suggest that causality should be thought of instead in terms of processes and mechanisms, rather than simply demonstrating regularities in the relationships between variables (Maxwell 2004a). Deriving causal explanations from a qualitative study is not an easy or straightforward task, but qualitative research is not different from quantitative research in this respect. Both approaches need to identify and deal with the plausible validity threats to any proposed causal explanation. A major strength of qualitative studies is therefore their ability to get at the processes that lead to these outcomes, processes that experimental and survey research are often poor at identifying.

However, qualitative analysis in the form of single, in depth case studies, while good for generating hypotheses and locating causal mechanisms, is weak on external validity and specifying causal effects (Gerring 2007). Consider for example questions regarding institutional arrangements for environmental governance. Are sanctions always more effective at inducing behavioral change than rewards and, if not, under what conditions are rewards more effective? Are pollution problems, on average, more difficult or easier

to resolve than wildlife preservation problems? Do demands for new behaviors generally work better or worse than bans on existing behavior? As Mitchell (2002: 58-59) points out, such questions are difficult to answer convincingly with single cases, because most institutional arrangements do not employ both sanctions and rewards, address both pollution and wildlife problems, or both ban some behaviors and require others.

Accordingly, single case studies may generate compelling findings that the case studied quite well but in doing so, sacrifice the ability to map those findings to other cases. In this sense, the comparative approach offers advantages since it allows for a controlled case comparison as an approximation to the logic of experiment, while including rich and detailed case studies which can be considered as insight generating on their own terms. The researcher is able to study the selected country cases in depth and is closer to the data, so the problems of comparability and concept stretching are alleviated; appropriate countries can be chosen and richer, multidimensional, less abstract concepts can be employed. Furthermore, "considerable attention can be paid to unravelling complex relationships including relationships of multiple and conjunctural causation within each country and over time" (Lor 2014: 14).

In this sense, comparative analysis can help the researcher move along the spectrum from statements of possibility towards statements of probability. It offers the potential to replace claims that "this strategy worked in this historical case" with more convincing policy relevant and contingent prescriptions of which strategy is likely to work best to address a given problem under given conditions. This advantage of the comparative approach is explained by Ragin (1987: 35) as follows: "The goals of case oriented investigation often are both historically interpretive and causally analytic. Interpretive work attempts to account for significant historical outcomes or sets of comparable outcomes or processes by piecing evidence together in a manner sensitive to historical chronology and offering limited historical generalisations which are sensitive to context. Thus, comparativists who use case oriented strategies often want to understand or interpret specific cases because of their intrinsic value (…). The companion goal is to produce limited generalisations concerning the causes of theoretically defined categories of empirical phenomena common to a set of cases."

The choice to employ the comparative approach in this thesis was therefore taken because it picks out a path through what Evans (1996: 4) calls the 'eclectic, messy center'

in the methodological field, located between the alternatives of general theory and deep immersion in specific cases. This revised interpretation of Mill's technique delivers powerful advantages. Contrasting cases adds confirmation that comes from observing differences in the causes that cannot be observed in single case studies. The deliberate selection of cases that match in other relevant respects eliminates threats to the inference's validity that would often be present without this design. A multiple case study designed this way is more convincing than many single case studies and many studies of multiple cases selected without regard to theory, yet is still able to deliver the payoffs of the case study that are lacking in statistical studies.

## The comparative logic of this study

Much of the existing literature on drivers of deforestation suffers from methodological drawbacks. The statistical methods employed by macro level, quantitative studies for example, are often suspect; they mix proximate causes and structural causes in their independent variables and raise potential statistical problems of multicollinearity and biased estimates, distorting the interpretation of cause and effect (Rudel & Roper 1997; Kaimowitz & Angelsen 1998; Geist & Lambin 2001). Moreover, in order to produce meaningful cross country results, structural causes are assumed to affect deforestation in the same manner across countries. This is obviously a strong assumption because studies indicate that the effect of and interaction between demographic, economic and governance related factors may differ greatly from one country to the next (Kaimowitz & Angelsen 1999: 81).

That said, local level case studies, while having the virtue of pointing to clearer policy directions, tend to lack a sense of proportion. A study on say, the growing demand for forest resources in the Copperbelt of Zambia may contain some more generalisable lessons for policymakers at national or possibly regional level, but does not take into account the full range of structural causal factors, as well as the various geographical and historical contexts involved (Rudel 2005: 20). Accordingly, analysis in this thesis takes place at the country level, in line with the orientation of most comparative social science towards what Ragin (1987: 3) calls 'large macrosocial units.' The task of the comparativist is to try and identify the similarities and differences amongst these units in order to try and understand, explain and interpret diverse outcomes. These similarities and differences constitute "the most significant and easily identifiable features of the social landscape," (*ibid*: 6) hence the preference in this study for national level explanations that cite macrosocial phenomena.

Unlike in statistical studies, which employ sampling, the cases themselves are carefully selected for the purpose of the study. A number of factors come into play when considering this. It is intuitively obvious that there is little point in comparing entities that are so different that hardly any commonality can be found. Neither would it be useful to compare entities that are so similar that little difference of interest can be found. Instead, when cases are selected for comparison, they should be comparable in respect of the phenomenon or theory that is of primary interest in the study. Sartori

(1991: 246) has stated that the entities to be compared should have both shared and non-shared attributes. They should be at the same time 'similar' and 'incomparable.'

With these criteria in mind, two countries, Zambia and Mozambique, appear as likely candidates for comparison. Geographically, they are of a similar size – Zambia's total land area is 753,000 $km^2$ and Mozambique's is 801,600 $km^2$. This makes them the 39th and 36th largest countries in the world respectively. As neighbours on roughly the same latitudes they have similar ecological and climatic characteristics, and share a major southern African river system, the Zambezi. They have similar, tropical climates, with the wet season beginning in October/November and the dry season in March/April, and temperatures averaging between 10°C and 25°C in winter and 18°C and 30°C during summer. Each of them has large expanses of forest, covering an area of 49.9 million hectares in Zambia (66 per cent of the country), and 40.6 million hectares in Mozambique (51 per cent of the country). In both countries, miombo is the predominant forest type. This makes them key members of the miombo eco-region.

The two countries also share a number of socio-economic characteristics. Both belong to a select cluster of African countries that made the transition to democratic rule in the early 1990s. Until November 1990, Mozambique was formally a socialist one party state ruled by the Liberation Front of Mozambique (FRELIMO). During the 1980s it suffered one of the most protracted and devastating wars on the continent, claiming the lives of one million people and displacing more than six million. As early as 1983 however, the government began to introduce various political reforms aimed at transforming the country into a more pluralistic society. Those efforts culminated in the enactment of a new constitution in November 1990 which provided for a multiparty political system, a market based economy and free elections. In 1992 a General Peace Accord was signed and in 1994, after the enactment of constitutional guarantees for a multiparty political system, successful elections were held. FRELIMO retained government control and the former rebel movement, the Mozambican National Resistance (RENAMO) became the main opposition party. Since then four general elections have taken place, most recently in 2009, with FRELIMO retaining control in each one.

Zambia made a similar political transition in 1991 following a series of economic crises and protests against the state during the 1980s. Economic grievances were channelled into political demands for multi-party democracy, resulting in a peaceful transfer of

power from the incumbent party, the United National Independence Party (UNIP), to the cross ethnic pro-democracy movement, the Movement for Multiparty Democracy (MMD). Since then, Zambia has held four multi-party parliamentary and five presidential elections, most recently in 2011 when the main opposition party, the Patriotic Front (PF), staged the first change of government since the MMD gained power in 1991. This places Zambia amongst a select group of African multi-party systems along with Benin, Cape Verde, Ghana, Madagascar, Mali and Mauritius that have experienced two peaceful electoral turnovers, thus qualifying as a consolidated democracy under result oriented minimalist definitions such as Przeworski's (1991) definition of democracy as uncertainty of outcome and Huntington's (1991: 267) definition of democracy being consolidated when an incumbent has lost power twice through competitive elections.

In both Zambia and Mozambique, democratisation was accompanied by macroeconomic stabilisation, the privatisation of state assets, public sector reform, agricultural reforms, the lifting of trade barriers and de-regulation of the financial sector. The result was an almost overnight transformation from predominantly socialist systems of central planning and control to market oriented private sector driven economies. Mozambique experienced a subsequent economic take off, with the average real GDP growth rate soaring from 0 per cent (1981–1992) to 8.1 per cent (1993–2008), making it the fastest growing non-oil economy in sub-Saharan Africa over the period (AfDB 2009). Good macroeconomic management also attracted substantial foreign direct investment (FDI), with inflows increasing from an average of 1.5 per cent of GDP in 1993–98 to an average of 5.2 per cent of GDP in 1999–2010 (Nucifora & Pereria da Silva 2011). As a result, per capita GDP has trebled since 1992 and the poverty headcount fell from 69 per cent in 1996 to 54 per cent in 2002 (Thurlow & Wobst 2004).

In Zambia the initial results of the reforms were not as spectacular, thanks largely to fluctuating world prices of its main export, copper (World Bank 2004). However, since 1999, economic growth has been on an upwards trajectory, averaging more than seven per cent GDP growth per annum, the longest uninterrupted growth period since independence (IFAD 2011). In 2006, inflation was brought down to single figures for the first time in history, enabling the government to reach the Heavily Indebted Poor Countries (HIPC) completion point, and resulting in the cancellation of most foreign debt. Today the country has a growing trade surplus, increasing foreign exchange

reserves and an exceptionally low level of public debt.

Despite high levels of recent economic growth though, the economies of Zambia and Mozambique remain largely dependent on subsistence agriculture, resource extraction and a few isolated mega projects. In Mozambique, agriculture accounts for 25 per cent of GDP, around 75 per cent of total employment, and is the main source of income for over 80 per cent of the population (World Bank 2011). It is followed by manufacturing (12 per cent), trade and retail services (11 per cent), transport and communications (10 per cent), financial services (seven per cent) and extractive industries (one per cent). Zambia has a similar economic structure. Agriculture accounts for about 17 per cent of GDP and 70 per cent of employment, while manufacturing adds 18 per cent to GDP, and services about 60 per cent (Green 2009). Mining exports centred on copper account for 70 per cent of the total value of exports and around six per cent of GDP (ZDA 2011).

Critics argue that Zambia and Mozambique's failure to transform the structural nature of their economies is the result of development strategies driven by the demands of foreign investors, in conjunction with local elites with strong ties to the ruling apparatus. This has resulted in the promotion of large scale industrial and resource extraction projects via tax holidays, changes to mining and labour codes and the waiving of environmental regulations. However, these foreign owned, capital intensive, export oriented companies make only a small contribution to job creation, tax revenue, use of domestic intermediate inputs and profit reinvestment (Nucifora & Pereria da Silva 2011). Instead of royalties and taxes from those projects being employed to benefit surrounding communities and to underpin a broad range of social and redistributive programmes, they have been established in a way that negates the possibility of any kind of nationalist or developmental state emerging (Saul 2011).

Moreover, despite their strong growth rates, Zambia and Mozambique continue to remain heavily dependent on foreign aid, further weakening the ability of their governments to chart an independent developmental path. Mozambique is widely recognised as a 'donors darling' thanks to its compliance with International Monetary Fund (IMF) and World Bank economic policy prescriptions. Since 1993, aid inflows have remained fairly constant as a percentage of GDP, at an average of around 14 per cent of GDP a year, financing investments in education and health and substantial investments in rebuilding the country's infrastructure. Between 1992 and 1999, the average aid given

to Mozambique stood at US$1.36 billion per year, and between 2000 and 2010, grew to US$1.54 billion per year. In 2009, Mozambique recorded total ODA of over US$2 billion, an all time high, substantiating the view that the country has become structurally dependent on aid (Phiri 2012).

Zambia has received similarly high level of aid. Between 2000 and 2010 average ODA per capita was US$86, higher than the equivalent figure of US$74 in Mozambique during the same period (OECD 2012). However, aid flows have tended to fluctuate due to differences in the government's economic governance performance. This has led some observers to conclude that an economic liberalisation agenda has been maintained and has progressed due to persistent donor support and conditionality (Wohlgemuth & Saasa 2008; OPM 2010). The importance of aid in Zambia is also revealed by its contribution to the government budget between 2000 and 2005, when it accounted for an average of 43 per cent of the total. Since then however, its contribution has dropped to around 30 per cent of the budget in 2007, and to just over 20 per cent of the budget in 2011 (Faust et. al. 2012).

In both countries the ruling parties have also been heavily criticised for not supplying the kinds of socioeconomic benefits demanded by citizens (Cuanguara & Hanlon 2010; Hanlon 2010). Mozambique still ranks as one of the poorest countries in the world, with over 70 per cent of the population living on less than US$1 a day, and lacking basic services such as clean water supplies and access to health facilities and schools (World Bank 2011). Since 2002, poverty reduction has stalled, and in the UN's latest Human Development Index, Mozambique ranks 184th of 187 above only Burundi, the Niger and the DRC (UN 2011). In Zambia, although overall rates of poverty fell between 1998 and 2006, gains have recently stalled, and in some rural areas have been reversed (Phiri 2012). Its HDI ranking is slightly better than Mozambique's but actually experienced a fall in value until 1999, thanks to the elimination of food subsidies and free social services, and has improved only slightly since then. More than 60 per cent of the population still lives on less than US$1 a day.

The two countries also fare poorly on indicators of inclusive concepts of democratic consolidation such as a viable and competitive party system, respect for and efficacy of key institutions, accountability to citizens, and tolerance of participation by the media and civil society in the political process (Gyimah-Boadi 2004; Bogaards 2007). In

Zambia, two decades of multi-party rule under the leadership of the MMD has been marked by the failure of institutional reforms to counter state malpractice and corruption. Repeated attempts to reform the constitutional rules that would have allowed more autonomy for the electoral commission, parliament and media have failed, resulting in continued gaps in accountability and the growing concentration of power in the executive office (Rakner & van de Walle 2009; Rakner 2012). Similarly in Mozambique, there is a lack of entrenched democratic culture amongst elected public representatives, and few civil society organisations are involved in formal and informal accountability mechanisms. Governance remains rooted in a top down centralist model resulting in the politicisation of local consultative forums, a lack of linkages between community based organisations, citizens and government decision making structures, and a lack of political commitment to accountability (Phiri 2012).

Accordingly, on many of the measures predicted to have an impact on rates of deforestation, Zambia and Mozambique appear to be roughly similar. They are of a similar size, share similar types of climate and vegetation and are both heavily forested. Their demographic makeup is roughly similar, and the population of both countries is predominately rural. Both have experienced similar rates of population growth and similar patterns of rural-urban migration during the last 20 years. Both also underwent transitions to multiparty democracy and rapid economic liberalisation in the early 1990s, and since then have experienced strong economic growth. However, their economies continue to be dominated by smallholder agriculture, and despite some noticeable advances in poverty reduction, the majority of their citizens still live on less than US$1 a day. Both countries also continue to rely heavily on donor assistance and policy prescriptions.

Following many of the standard predictors of deforestation rates outlined in Chapter Two then, we might reasonably expect Zambia and Mozambique to have experienced similar levels of deforestation during the last two decades. This is not the case though. Between 1990 and 2010 total forest cover in Mozambique declined by 5.2 million ha, at an annual rate of 0.64 per cent (260,000 ha) per annum. While this is high, placing Mozambique amongst the top 40 countries in the world by annual percentage change in forest cover, it is still manageable. In Zambia however, total forest cover has declined by 8.5 million ha, at an annual rate of 1.24 per cent (425,000 ha) per annum. These rates of loss are nothing less than catastrophic, and give Zambia the dubious honour of having the highest rate of deforestation in the world for any country with a forest estate greater than 25 million ha

(see UN-FAO, 2010).

The difference in these rates of deforestation represent something of a puzzle, particularly in light of the two countries' respective demographic characteristics. Zambia's total population in 2010 was 13.04 million, having grown from 9.88 million in 2000 and 7.75 million in 1990. This gives the country an average population growth rate of 3.41 per cent. Rural dwellers made up 61 per cent of the total population in 2010, compared to 65 per cent in 2000 and 62 per cent in 1990. In Mozambique, total population in 2007 was 20.64 million, up from 16.11 million in 1997, and giving it a population growth rate of 2.81 per cent. Rural dwellers there made up 70 per cent of the total population in 2007, slightly down from 71 per cent in 1997. Thus, while rates of population growth, rural/urban divides and migration patterns in each country are roughly the same, Zambia's population density is lower at 17.3 persons/$km^2$ than Mozambique's at 29.7 persons/$km^2$.

Yet Zambia, despite having a population density that is more than a third lower than Mozambique's, has a deforestation rate that is almost twice as high. As the figures in Table 2 on the following page show, this makes little sense – if anything, a quick comparison suggests it should be Mozambique that has the higher rate of deforestation. Admittedly, these figures are indicative, and are not meant to replace serious, sustained quantitative research. However, they do suggest that explanations which rely primarily on quantitative economic and demographic indicators miss out an important part of the picture. In line with the governance based explanation outlined in the opening chapter of this thesis, that 'missing part' is likely to be accounted for by the role of governance and institutions.

The problem with governance factors however, is that they are very difficult to measure using quantitative indicators. This is why, while the preliminary comparative analysis does include some broad institutional arrangements (for example, types of political regime) it says very little about others such as corruption, land tenure, legislation or decentralisation. There are some resources, such as the Corruption Index or the World Governance Index, which do offer a possible way of operationalising governance, but these are relatively broad, and unable to capture more specific effects in either the forest sector or related sectors. This makes it more difficult to determine the effect of governance and institutions on deforestation in Zambia and Mozambique using statistical analysis alone, and is why the comparative, case study based approach offers the most appropriate method for explaining the apparent discrepancy between each countries' rates of deforestation.

| Indicator | Zambia | Mozambique |
|---|---|---|
| Land area | 752 618 km$^2$ | 799 380 km$^2$ |
| Forest area | 49.9 million ha (2004) | 40.6 million ha (2005) |
| Population | 13.04 million (2010) | 23.93 million (2011 est.) |
| Population density | 17.3 persons/km$^2$ | 29.7 persons/km$^2$ |
| Population growth rate | 3.41% | 2.81% |
| GDP (2011) | 19.21 billion (2010 US$) | 12.80 billion (2010 US$) |
| GDP per capita (2011) | 1,160 (2010 US$) | 470 (2010 US$) |
| GDP growth (1990 - 2011) | 7.60% | 8.16% |
| Poverty rate | 59.3% (2006) | 54.7% (2008) |
| External debt (2011) | 25.7% | 43% |
| Net ODI received (1990-2010) | 24.2 billion (2010 US$) | 35.8 billion (2010 US$) |
| Economic Freedom Index (2010) | 100 of 179 | 111 of 179 |
| Democracy Index (2010) | 97 of 167 | 92 of 167 |
| Corruption index (2011) | 101 of 178 | 116 of 178 |
| Human Development Index (2010) | 150 of 169 | 165 of 169 |
| Deforestation rate (1990-2010) | 425,000 ha/annum | 260,000 ha/annum |
| Annual change in forest cover | -1.24% | -0.62% |

**Table 7**: Economic, demographic and institutional indicators for Zambia and Mozambique
*Sources: World Bank Development Indicators; Organisation for Economic Cooperation and Development Statistics; United Nations Food and Agriculture Organisation Global Forest Assessment; Heritage Foundation Index of Economic Freedom; Economist Intelligence Unit Democracy Index; Transparency International Corruption Index; United Nations Development Programme Human Development Index.*

## Research design

The research approach employed by this project is primarily qualitative in nature, and based on a combination of interviews and site visits conducted in Zambia and Mozambique between January 2011 and July 2011. This is backed up and corroborated by a wide range of materials and data, including hard to get institutional data (e.g. figures on the de-gazetting of forest reserves), satellite imagery and a vast array of documentation and reports from governments and domestic and international NGOs. The finished case studies also incorporate articles from domestic and foreign presses, and academic literature on politics, economics and natural resource management in each country.

The fieldwork was conducted as follows. Three to four months prior to my departure, I began building up a database of key individuals and organisations who were either involved in, or had specialist knowledge about forestry and forest governance in Zambia or Mozambique. I obtained the names of these individuals and organisations through government websites, online conference attendance lists, policy and research papers, the databases of multinational organisations such as the UN's FAO and the World Bank, and from personal recommendations by colleagues at the London School of Economics. Also, throughout the year preceding fieldwork, I regularly consulted online sources of news and commentary dealing with Zambia and Mozambique, looking for references to environment and natural resources related issues.

These techniques resulted in a list of around 30 to 40 persons in each country who I knew were involved in some capacity with forest governance or natural resource management. This approach allowed me to (at least temporarily) decide who should be interviewed, and which fields of inquiry should be addressed as part of my research. However, creating lists of organisations, people and questions did not ensure access to the various sources of information needed or to the participants and their field of practice. As such, early planning and coordination of sources and materials were the only ways of overcoming these problems. Accordingly, two months before arriving in each country, I sent an introductory email to each person on my database, personally addressed, presenting my research and asking for a possible meeting.

I obtained the titles and email addresses for most of these people from conference lists or via individual organisational websites. While a number did not reply, I was able to arrange interviews with at least 10 to 15 people in each country before I arrived. The creation of a database was also extremely useful in gaining an understanding of the general structure of the environmental sector in each country, and meant that I was already familiar with many of the names of people and organisations that respondents mentioned during the course of my interviews. Once I began conducting interviews I asked each interviewee for specific further recommendations and referrals. In this way, I was able to obtain the names and contact details of a number of other people who had not appeared during my online searches. This was particularly important in light of the nature of the forest sector in each country, since many people with specialised knowledge either have limited access to the internet or do not attend conferences and workshops.

I was aware that in larger, more developed countries, this referall technique runs the risk of creating sample bias since people are likely to recommend others within their own networks who hold similar views on a particular problem. However, in countries like Zambia and Mozambique the environmental sector is generally very small, comprising at most a few hundred individuals. Accordingly I was assured of obtaining a fairly representative sample. Using this approach I was able to conduct 71 interviews in Zambia and 53 interviews in Mozambique, lasting an average of one hour, and encompassing a diverse range of participants as possible. Respondents included both current and former national directors of forestry, country directors of multilateral and bilateral donor organisations and heads of departments of academic institutions. I also interviewed low and mid-level government employees and local officials in order to obtain a full range of views and opinions. A breakdown of the types of participants is provided in Table 3 on the following page (for a detailed list of all interviewees please see Annex 1). The majority of these interviews were conducted in the capital cities of Lusaka and Maputo, while a smaller proportion were conducted in the Copperbelt region of Zambia and regional forestry headquarters in Solwezi in Zambia and Beira in Mozambique.

My goal over the course of the interviews was to solicit individual opinions on the problem of deforestation, and knowledge about the active networks and organisations in the forest sector. What I was looking for was an account of how governance had evolved

over the previous two decades and how it had impacted (and is still impacting) forests in each country. I wanted to know who the responsible agency in government was, what the mandate of that agency was, and how effectively they were performing their role – what were they doing well, and what were they doing badly, and why? Often these questions were very political, since both countries have distinct hierarchical and clientelistic political cultures. I also tried to gain an understanding of how high a priority forest conservation was for the governments of these countries, and what kinds of policies and legislation were in place to achieve this.

As such, formal semi-structured interviews proved to be the most appropriate method of engagement. The open ended nature of each interview encouraged conversation and allowed for flexibility with respect to unanticipated issues, or in order to tap into the experience and insights of respondents (May 1993). My interviewing skills therefore had to be flexible enough to accommodate surprises in each conversation. Throughout the interviews, I was taking notes either of ideas that were emerging from what the respondent was telling me or important points to note when the interview was going in an unanticipated direction. The semi-structured format also provided a forum for the informants to question me, as the researcher, about my own biases, impressions, motivations and intentions. Accordingly, interviews were both "contextual and negotiated," and designed to avoid confirmation bias on my behalf (Charmaz 2006: 27).

| Organisation Type | Mozambique | Zambia |
|---|---|---|
| Academic and research | 8 | 13 |
| Bilateral donors and embassies | 6 | 6 |
| Central government | 14 | 11 |
| Local government | 5 | 6 |
| International NGOs | 7 | 13 |
| Local NGOs | 4 | 14 |
| Private sector | 9 | 8 |
| **Total** | **53** | **71** |

**Table 8**: Breakdown of respondents by type of organisation
*Source: Table created by author*

Before each interview, I informed the interviewee that that their views would not be made

public unless I had previously obtained their written consent. I said that, should I wish to attribute a direct quote, I would contact them and offer them the opportunity to remain anonymous. I also used written notes rather than an audio recorder during interviews, since many of the individuals I was interviewing were elites and I was worried that a recorder would make the respondent uneasy, too cautious or cause them to give me an official line only. I made it clear that interviewees had the right to refuse to answer any of the questions and were free to stop the interview at any time. These precautions were designed in order validate the subjective experience of my informants, a key ethical requirement of the research process (Oakley 1981).

The preparation of my list of questions was made before leaving for fieldwork. In order to elicit the ideas, views and opinions of my interviewees, I tactically developed questions in order to focus and organise this intended information (Johnstone 2007: 111). I began with questions about the individual's professional background. This served as both an 'icebreaker' and a way to establish each respondent's area of expertise and credentials. I then moved on to questions about rates of deforestation in their country, and about the key socio-economic activities that were driving this. This was important in terms of gathering data and in terms of ensuring the respondent was aware of the methodological distinction between proximate and structural causes of deforestation. The key part of the interview was taken up with questions about the structural causes of deforestation. These questions were left open-ended, in order to allow respondents to emphasise whether they thought these were the result of either demographic, economic or governance-related factors. I also asked about whether the respondent thought any of those drivers had changed over time. The final part of the interview was left open in order to follow any interesting lines of enquiry, or to confirm any earlier statements.

In addition to conducting interviews, I made four individual trip to deforestation 'hotspots.' These were places that had been recommended to me by individuals during the course of my interviews. In March 2011 I visited the city of Ndola, where I interviewed a number of academics and experts from the Copperbelt University, home to Zambia's most renowned forest research institute. Following this, I spent six days in Solwezi, in the far north west of Zambia. This part of the country is home to the largest unbroken expanse of miombo forests in southern Africa, and gave me a chance to see miombo in its pristine state. However, in recent years, there has been some significant isolated examples of deforestation due to new settlements, especially in and around two major mines in the

province, the Kansanshi Mine and Lumwana Mine.

In April 2011, I visited the town of Mpika in north east Zambia. This area is one of Lusaka's main sources of charcoal supply and has experienced significant deforestation. A number of forest reserves are now so badly degraded that they have been de-gazetted by the government. Nevertheless there are still some isolated patches of pristine miombo in some of the more remote areas. I spent a number of days there with officials from the local forest services, and accompanied them on a series of patrols. This trip also allowed me to witness first hand the effects of the charcoal trade in action, since Mpika lies on one of the country's main transportation routes, linking Lusaka to Tanzania, the DRC and Kenya in the north, and Zimbabwe and Botswana in the south.

In June 2011 I visited the city of Beira, home to the former headquarters of Mozambique's forestry and wildlife services. Deforestation in this area during the last 20 years has been rampant, especially in and around the peri-urban outskirts of the city. The area is also home to some of the country's largest forest plantations and commercial logging companies. There have been significant concerns in recent years about illegal logging in the area, and the Beira port has been identified in a number of reports as a key transit point for foreign companies shipping unregistered timber products overseas. Following a week in Beira, I spent three days in the nearby Gorongosa National Park. This area has seen the implementation of a number of CBNRM programs in recent years, and the forests there are in good condition. I also spent two days visiting the forestry service headquarters in the nearby town of Chimoio, and a conservation project site in the Chimanimani National Park, two hours south.

These field visits, in addition to providing what Brady, Collier and Seawright (2004) describe as 'data set observations' which generate scores on independent and dependent variables, provided me with the opportunity to make 'causal process observations,' which shed light on the relationships amongst the independent variables and between these variables and the dependent variable. The active engagement of people, places and contexts also allowed me to carry out reality checks on many of the answers provided by respondents during my interviews. More generally, the fieldwork portion of this research project allowed me to either confirm or debunk hypotheses generated during the development of the conceptual analysis, and allowed for contextual and discursive insights that might not have been available via more generalised macro level approaches. Finally, the fieldwork provided me with an opportunity to determine whether my findings had any broader relevance for the

societies under investigation.

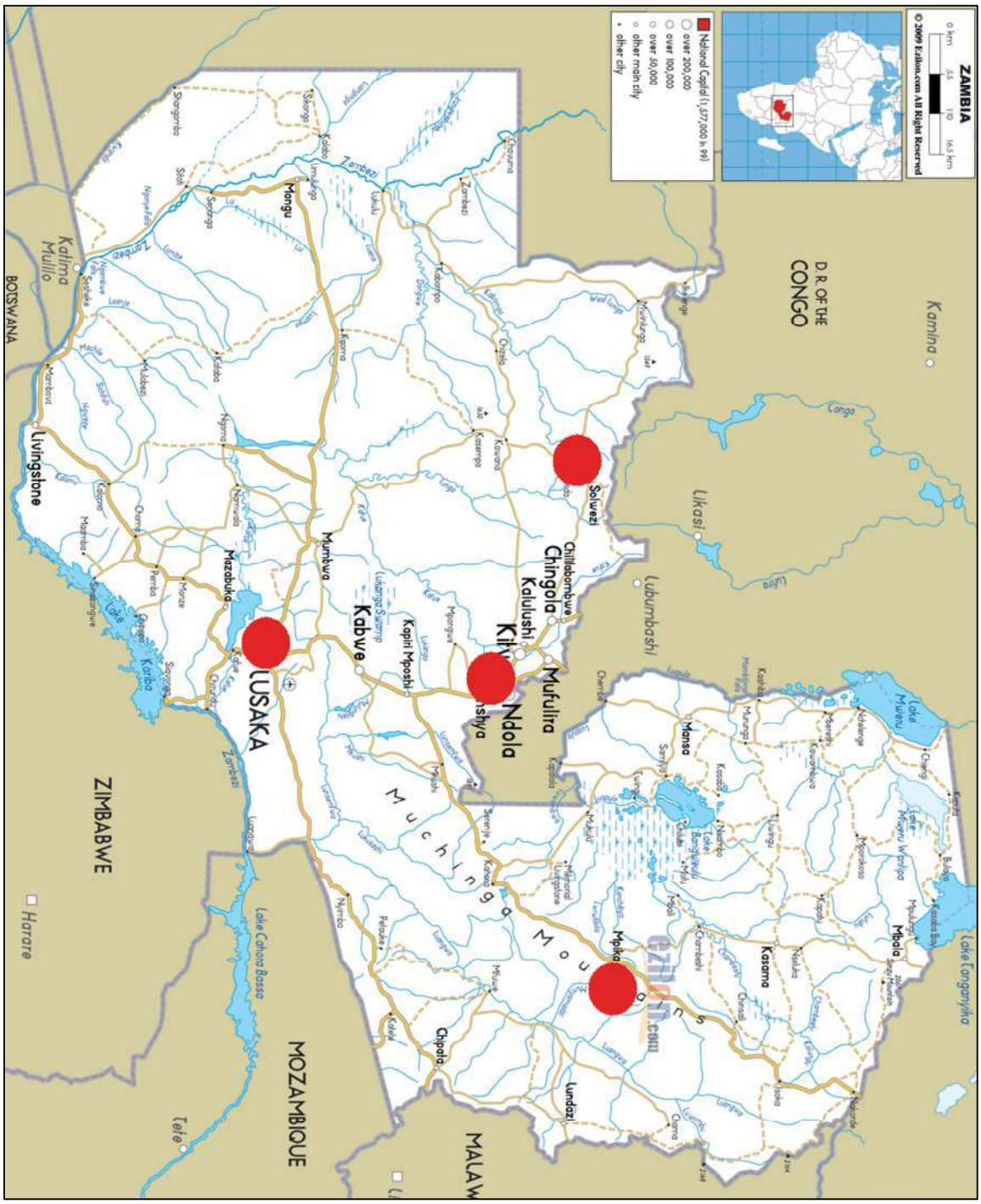


**Figure 10:** Sites visited during fieldwork in Zambia
*Source: Mappery.com*


**Figure 11:** Sites visited during fieldwork in Mozambique
*iSource: Mappery.com*

# 4

# Rates and Proximate Causes of Deforestation in Zambia and Mozambique

In this chapter, I present some of the key findings from my fieldwork. In the first part, I look more closely at the existing data on rates of deforestation in Zambia and Mozambique – the key variable which this study is trying to explain. Much of this data is either inaccurate or unreliable, and research in this area has generally been plagued by a failure to properly investigate the origin of widely accepted figures. Zambia for example, is often cited as a country with the world's second highest rate of deforestation, an error resulting from methodological mistakes made during a series of provincial forest assessments in the late 1990s. Similarly, data on deforestation in Mozambique from a recent 2007 national inventory is based on simplified and highly unreliable models linking population growth to environmental degradation. Despite this, these figures are widely cited and reported without any caveats in a number of reports and policy documents in national and international fora.

These potential inaccuracies are a crucial consideration for this research, since much of the comparative logic behind the choices of Zambia and Mozambique as case studies hinges on their different rates of deforestation during the period in question. If it turned out the data on the dependent variable in either case was incorrect, and that these countries had for example, experienced similar levels of deforestation, faced with similar economic and demographic pressures, but in different institutional contexts, it would make it very difficult to claim that governance was the most important determinant of difference. During the course of the research it was important therefore, to establish the

most accurate possible figures on rates of deforestation and to include any assumptions or caveats that may have compromised their validity.

In the second part of the chapter I present my findings on the proximate causes of deforestation in Zambia and Mozambique. While the focus of the research is on trying to understand the structural causes of deforestation in each country, it is impossible to do so without first knowing what activities are causing forest loss in the first place. Large scale agricultural expansion and illegal logging for example, may be the result of very different structural conditions, or they may be the result of very similar ones. However, there is little point in attempting to make this distinction unless we have more information on the nature and magnitude of those activities in the first place. An empirical account of the different proximate causes of forest loss in Zambia and Mozambique provides analytical clarity as well as being insight generating and valuable in its own right. Crucially, I make the argument that the proximate causes of deforestation in both countries are relatively similar. This makes it possible to subsequently conduct a useful comparison of different structural causes in Chapters Five and Six.

## Rates of deforestation

Obtaining accurate data for deforestation rates is notoriously difficult. At the macro level, large-N, cross country studies usually derive measures of levels of deforestation from the Forest Resource Assessments (FRAs) of the UN's FAO. This data has a number of serious shortcomings. FRA definitions of what constitutes a 'forest' has changed over the course of successive reports and the quality of the data is suspect, since it relies on individual member reporting. As Grainger (2007) has shown, these figures are often so unreliable as to be almost meaningless; while they can be used to extrapolate certain patterns, there are serious drawbacks to using actual data values for serious, sustained scientific research.

In recent years, partially in an attempt to address these shortcomings, a number of African countries have received funding from the FAO to update their forest inventories. Unfortunately though, this has done little to improve the quality of the existing data. This is because when researching rates of deforestation, there is an important distinction between studies which attempt to provide a snapshot (inventories) and those that estimate a trend. To get a trend you need data over time, and for that, you need a number of inventories. Unfortunately the last reliable forest inventories were carried out for many African countries during the colonial era. Even where new inventories have been released they are often subject to controversy thanks to different systems of vegetation classification.

Thus, despite the recent advent of easily obtainable satellite imagery going back at least 30 years there are significant gaps in the record. Satellite images may also often include the wrong 'tiles' which are different sizes to their equivalent modern counterparts, or which overlap on different coordinates and therefore increase the chance of sampling error (Achard et. al. 2007; Hansen et. al. 2008). There are also temporal and spatial problems related specifically to monitoring forest cover change in the miombo woodlands, where activities such as shifting cultivation are common (Temudo & Silva 2011). Spatially, this leads to a complex mosaic of primary or mature forest, cultivation fields and fallow vegetation. The small size of cultivation fields, usually between one and two hectares, consisting of plenty of bush or secondary forest, is an additional difficulty since at resolutions of one kilometre or less, they appear almost completely indistinguishable from healthier forest patches (Sedano et. al. 2005).

## Zambia

Until recently, the last reliable inventory data from Zambia came from between 1952 and 1967, when records were meticulously kept in the country's various colonial districts, and from vegetation maps compiled between 1967 and 1972. A number of assessments were conducted in the 1980s, but these extrapolated trends based on old district data and vegetation maps from the 1960s (de Backer et. al. 1986; Millington & Townsend 1989). A separate study combined the old data with low resolution satellite imagery at the regional scale (Erkkila 1989). These studies suggested that total growing stock was between 3 and 4 billion $m^3$ and that forest cover was somewhere around 60 million ha. The next major attempt to compile an inventory was done under the Zambia Forestry Action Plan (ZFAP) in 1996. However, while it was able to utilise newly available computer simulations, its core baseline data was still based on the 1960s district inventories and forest management plans – hopelessly out of date by this stage. Total growing stock was estimated at 4.2 billion $m^3$, and the forest estate at 43.6 million ha (Alajarvi 1996).

In 1998, the newly instituted Provincial Forestry Action Plan (PFAP) made an attempt to update some of the inventories, using 1993 as a reference year. However, inventories were only conducted in three of Zambia's nine provinces: the Copperbelt, Luapula and Southern Province. The choice of these provinces was due in a large part to their status as the most severely deforested areas of Zambia – a factor which made extrapolation of the results to the national level methodologically suspect. This did not stop the FAO from using those extrapolations for its FRA of 2000. To make matters worse, only two reference points were used for the UN study: 1974, based on an update of the 1960s data from de Backer & Chakanga (1986), and 1993, based on the new PFAP provincial forest inventories (Mukosha & Wamunyima 1998). Unsurprisingly, the study revealed hitherto unheard of deforestation rates, estimating total forest cover at 31.2 million ha, and deforestation rates of 851,000 ha/year between 1990 and 2000 (UN-FAO 2001). This is the origin of the often repeated claims that Zambia has the second highest rate of deforestation in the world.

In 2003, assessments were conducted in all nine provinces under the Forest Support Program (FSP), utilising up to date satellite imagery to define the limits and classification of forest cover (MTENR 2008: 9). The FSP also provided the first

comprehensive assessment of past inventories, revealing many of their shortcomings. The result was updated and independent inventory data, and the overall forest estate was estimated to be 33.5 million ha. Once again, this suggested an unprecedented rate of deforestation; however, as with the forest inventories conducted five years previously, there were significant misgivings, given that it was data from the provincial and local levels being applied to the national level. In 2005 therefore, the UN-FAO released its next FRA report, this time, with the data for Zambia based only on studies from the 1980s (Millington & Townsend 1989; Chakanga & de Backer 1986). The decision to use these as reference sources was taken, "because most publications base their references on these studies," and because there was a "certain degree of alignment in terms of forest description between the various national classes" (UN-FAO 2005b: 6). The resulting estimate of forest cover was 42.4 million ha, growing stock of 1.4 billion $m^3$, and annual deforestation rates of 444 800 ha between 1990 and 2005.

By the mid 2000s, officials realised that an update of the national forest inventory was urgently required. In 2005, a joint project between the Ministry of Tourism, Environment and Natural Resources and the FAO was launched, called the Integrated Land Use Assessment (ILUA). The project incorporated remote sensing data with sampling from 248 plots on the ground, and promised to provide the first objective assessment of national forest cover in Zambia in over 30 years. The results showed a growing stock of 2.9 billion $m^3$, and a much higher forest cover than previously thought, at 49.9 million ha (MTENR 2008). In a special study conducted alongside the ILUA, Abel Siampale, the officer from the Zambian Forestry Department in charge of remote sensing, carried out his own, independent assessment of forest cover change using satellite images from Google Earth, and reported that annual forest loss between 1990 and 2005 averaged between 250,000 ha and 300,000 ha. However, by his own admission, these results were likely to be compromised by the poor quality of the images used, and by mismatches between Google's standard tile coordinates and those of the ILUA report.

Another problem was that sampling intensity for the ILUA was not ideal – of the 248 plots identified 221 were analysed, and the sampling error for forested land was 7.8 per cent at 95 per cent probability (MTENR 2008). Considering this figure equates to almost 4 million ha of forest estate, it represents a significant margin of error. Nevertheless, the ILUA and its companion study were a significant improvement over previous estimates

of deforestation rates. They were certainly more accurate than the FAO's latest estimate from its FRA of 2010. This utilised the same GIS tiles as the ILUA, but since it operated on different geographic coordinates, only 66 were valid. This meant the sample size was too small, and the data was hopelessly inaccurate, reporting an annual deforestation rate of 166 600 ha between 1990 and 2010 (UN-FAO 2006a). This rate is almost three times lower than the one reported in the FRA of 2005, and almost six times lower than reported in the FRA of 2000. Needless to say, consistency has not been one of the FAO's strong points.

The overall impression of forest inventories and the estimation of deforestation rates in Zambia is thus fairly chaotic. Until the ILUA was released in 2007, there had been no objective assessment of the condition of the vegetation cover since 1967. Moreover, since many of the data sets have been collected independently of each other, there is a lack of consistency of applied methods (Kamelarczyk 2009). Accordingly, while deforestation is unlikely to be as rampant as the 2000 FAO report claims, nor is it possible for it be as low as suggested by the ILUA report from 2008 or the UN's latest FRA of 2010. Taking their particular merits and shortcomings into account, it seems that the true figure is likely to be a weighted average of these reports. Accordingly, the figure adopted in this research project is an average annual loss of 425,000 ha (1.24 per cent) between 1990 and 2010.

## Mozambique

Forest inventories in Mozambique have been conducted with more regularity than in Zambia, although for obvious reasons none were conducted during the war. Since the 1970s, there have been three main inventories, plus updates and a number of smaller local inventories. The first ever large scale inventory was carried out in 1980. It used Landsat Multispectral Scanner System (MSS) images from 1972, combined with exploratory sampling in commercially important forests. The result was one national and ten provincial 1:1,000,000 maps with information on forest type/land use, timber volume, proportion of valuable timber species, location of potential timber production forests and a regeneration assessment. However, because of limited resources for image interpretation and ground verification, the results of the 1979/1980 inventory were of relatively low precision (Michalak et. al. 2002). There were also some glaring mistakes. For example, the agricultural area was underestimated by around 3.6 million ha due to cashew trees, mango trees and coconut palms being classified as other wooded land or even forests (FRA 2005: 15). Forest types were also underestimated due to the poor quality of some of the images used and to the some of the images being taken in the dry season, when most of the trees were leafless and therefore not detected.

In 1994 therefore, a concerted attempt was made to update the inventory, using Landsat Thematic Mapper (TM) images from 1990 and the same land cover classification as the 1980 inventory. It also incorporated a partial ground survey, and corrected the previous errors on agricultural area estimates. The national and provincial maps were updated and a new 1:250,000 map of mangroves was produced. Although the update suffered from the same types of precision problems as the 1980 inventory, it did derive a far more accurate indication of land use type and the magnitude of natural vegetation change by utilising two similar sets of images. The total extent of forest cover was estimated at 20 million hectares in 1990 and a total loss of 2,739,106 ha of forests and other wooded land was estimated for the 18 year period between 1972 and 1990 – an annual loss of around 152,000 ha per annum (Saket 1994).

The following year the National Directorate of Forestry and Wildlife, supported by the FAO and the United Nations Development Programme (UNDP), prepared an additional national forest types map with a higher resolution of 1:250,000. It used the same set of Landsat images as the 1994 study, but with different vegetation

classifications: 20 as opposed to 17 in the previous two studies (Michalak et. al. 2002). The results from the 1995 study were used for the FRA of 2000, which estimated deforestation rates at 64,000 ha a year between 1990 and 2000, and for the FRA of 2005, which estimated rates at 50,000 ha a year between 1990 and 2005. These are almost certainly inaccurate, since they effectively estimate rates for all the years *after* 1990 using data that only exists for the years *before* 1990.

In 2007, this perverse situation was partially rectified by an updated national forest inventory funded by the FAO and the Italian government. Controversially, the report was undertaken by an Italian geographical information systems (GIS) company called Agriconsulting S.p.A, at the insistence of FAO headquarters in Rome. According to Carla Cuambe, an official at the UN-FAO, at the time the move was heavily criticised since it did not incorporate input from people with previous expertise in Mozambique. The final report, authored by Marzoli (2007), utilised LANDSAT 5 TM images from the 2004/2005 period, and adopted the new FAO land cover classification. The mapping benefited from extensive fieldwork in the entire country for control and validation of interpretation, and updated technology to allow for on screen visual interpretation of the satellite image results (FRA 2010). Forest cover was estimated to be 40.6 million hectares (51 per cent of the country), while other wooded formations, such as thickets, shrubs and forests with shifting cultivation, covered 14.7 million hectares (19 per cent of the country).

However, while the accuracy of the land cover map was relatively high – between 86 per cent to 80 per cent for the main land cover classes and greater than 90 per cent for the forest classes, there were some major problems with the estimates of deforestation rates. Thanks to the new land category classifications, the 2007 inventory could not be realistically compared the 1994 and 1980 inventories. Instead, the authors took the decision to use a model that drew a direct link between population growth and forest cover. Justifying this decision, they explained, "the basic assumption of the model is that population pressure is the main factor behind deforestation. Human population growth generates the need for new agricultural areas and deforestation due to high demand for woody biomass to produce charcoal" (Marzoli 2007: 59, *translated*). However, the figure they obtained, 219,000 ha per annum, is unreliable since the model on which it is based, from the FRA of 1990, has been so thoroughly discredited by the existing literature. Indeed, it seems strange that the decision to use such a model was taken by a reportedly reputable GIS firm in the first place.

It is therefore still unclear how much of the discrepancy between the 2007 inventory and the 1994 inventory is due to the reclassification of forests to match with UN categories, and how much is due to real changes. There is still no reliable data for national rates of deforestation, despite assurances from the FAO to the contrary. Instead, it is probably more informative to look at two other indicators on rates of deforestation. The first is for mangroves, for which it was possible to make a comparison between the 1972 1990 and 2004 figures since the formations are relatively easy to identify and delineate with satellite imagery (Marzoli 2007). The 2007 inventory revealed that the total area of mangroves lost between 1972 and 2004 was 51,000 ha. The rate of decline increased from 67 ha per year (0.2 per cent) between 1972 and 1990 to 217 ha per year (0.7 per cent) between 1990 and 2004. Extrapolated to the national level this would equate to a loss of 277,000 ha per year.

The second study was a detailed analysis of changes in land cover in Manica Province for the period between 1990 and 2004 (Jansen et al. 2008). The study utilised Landsat 5 images, comparing identical image tiles taken from the two dates. This revealed a total forest loss of 464,000 ha during the period in question, corresponding to an average annual rate of 0.81 per cent. Extrapolated to the national level, this would equate to 322,000 ha. However, as detailed in a WISDOM (2008) report on charcoal usage in Mozambique, mangrove forests in Mozambique have been especially hard hit in the last 20 years, and the Manica province is currently in 'deficit' for its local balance level for woody biomass. These two studies are therefore likely to represent the upper limit of national deforestation rates. Assuming therefore that the 2007 national inventory represents the lower limit, it seems reasonable to estimate an annual average deforestation rate of 260,000 ha (0.62 per cent). While this figure could conceivably be lower it is very unlikely to be higher, and for the purposes of this study appears to be the best possible estimate given the current shortcomings of existing data.

## Proximate causes of deforestation

According to a definitive study by Geist & Lambin (2001), proximate causes of deforestation are human activities that connect changes in land cover (biophysical attributes of the earth's surface) and land use (human purpose or intent applied to human activities that directly alter the physical environment). These activities reflect human goals which constitute underyling social driving forces. They are different from structural causes of deforestation in that they can be interpreted as the more immediate, direct forms of land use and directly impact upon forest cover (Ojima et. al. 1994). Identifying both the proximate causes and structural causes in the course of this analysis is important, since the major interactions and feedback processes between these factors reveal the system dynamics that commonly lead to deforestation.

In the deforestation literature (e.g., Ledec 1985; Lambin 1994; Mainardi 1998; Kaimowitz & Angelsen 1998; Contreras-Hermosilla 2000), proximate causes are commonly grouped into three broad categories: expansion of cropped land and pasture, harvesting or extraction of wood, and the expansion of infrastructure. However, as pointed out by Geist & Lambin (2001: 6), a number of other activities, such as cattle ranching or the setting of fires, can also be included as they are broad, aggregate entities which do not lend themselves easily to categorisation. In Zambia and Mozambique, three proximate causes stand out as the key activities driving land use change. Shifting cultivation is the leading cause, identified by more than half of all respondents during the course of this research. It is followed by charcoal production, identified by about one third of respondents, and uncontrolled fires, identified by around one tenth. A fourth cause, illegal logging, was identified by a very small percentage of respondents in Mozambique. A visual representation of these responses is displayed on the following page.

Most respondents however, emphasise that deforestation is usually caused by some combination of at least two of these proximate causes, and usually all three. The results are backed by most of the available literature. For example, in their most recent evaluation of their support to the forest sector in Zambia, the Finnish Development Agency suggests that the main causes of forest degradation are "clearance for agricultural production and the dependence of a large proportion of the population, even those in urban areas, on woodfuel for energy" (Hardcastle et. al. 2010: 2). For

Mozambique, they also identify woodfuels and shifting cultivation, as well as "wildfires, which are one of the most serious threats to forest resources" (FINIDA 2009: 11).

In other research, Chitondo (1997) finds that, "most forest area in Zambia is lost annually through deforestation resulting from agricultural expansion and charcoal production," while for Mozambique, Ribeiro (2009: 3) suggests "the main cause of deforestation in the country is human pressure in the form of burning forest areas to open cultivation areas, firewood collection and charcoal production." Zambia's recent Readiness Plan Idea Note (R-PIN) to the World Bank for UN-REDD+ funding identifies, "the expansion of agriculture and escalating demands for woodfuel (charcoal) and timber as the main reasons for the huge losses of woodlands and forests" (Chunduma 2009). Similarly, Mozambique's R-PIN application reports that "the sources of forest loss and degradation include subsistence and commercial agriculture due to unsustainable land use practices including use of fire in land clearing and hunting and increasing demand for biomass energy in the urban areas" (GoM 2011: 7).

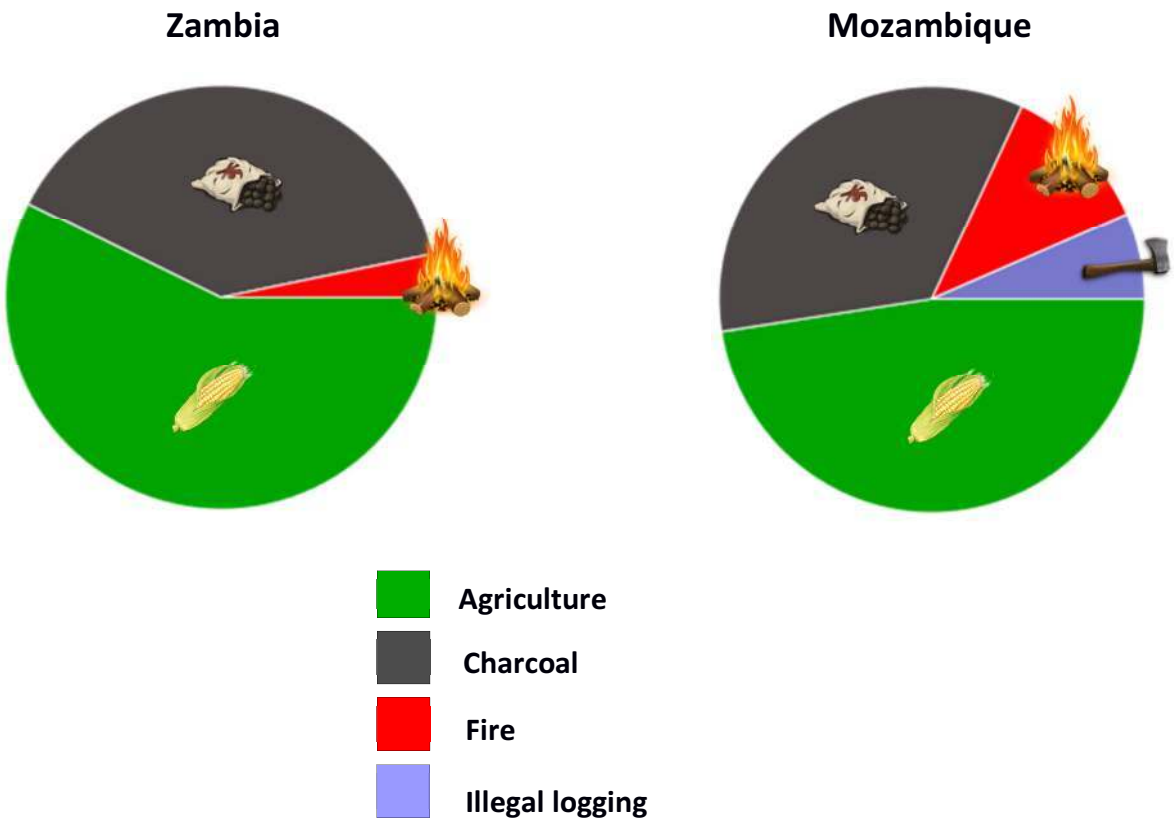


**Figure 12**: Proximate causes identified by respondents as the leading cause of deforestation in each country.
*Source: Author's own image*

## Shifting cultivation

The impact of agriculture occupies a central position in contemporary debates around deforestation in developing countries (Ruthenberg 1976; Stromgaard 1989; Nandwa 2001). The debate revolves around the practice of shifting cultivation, an agricultural system that involves alternation between cropping for a few years on selected and cleared plots and a lengthy period when the soil is rested. Since it often involves burning to assist with clearing vegetation and to increase soil fertility, it is also known as slash and burn agriculture. Traditionally it is the method used by smallholders with minimal access to equipment and inputs and with little knowledge of modern farming techniques. In Mozambique, smallholders account for 96 per cent of all farm households, and for 90 per cent of the area of land under cultivation (World Bank 2011). In Zambia, smallholders account for 80 per cent of the farming sector and 85 per cent of the area of land under cultivation (CSO 2011).

In both countries subsistence farming predominates, with only marginal surpluses sold in local markets (Batadizirai et. al. 2006). Inputs are minimal – in 1999 for example, the percentage of irrigated cropland in Zambia was less than one per cent, compared to nearly four per cent in the rest of sub-Saharan Africa (SSA) and 18 per cent in the rest of the world. Average fertilizer use was ten kg per ha, below the SSA average, and nearly ten times less than the global average (Jorgensen & Loudjeva 2004; Jayne et. al. 2007). In Mozambique, the FAO estimates the country's irrigation potential at 3.3 million ha, yet only 40,000 ha are currently irrigated, and not all of that is functional or effective (UN-FAO 2002). Less than five per cent of households use fertilizer, and only slightly more than ten per cent of smallholders use animal traction.

The dominant technique in both countries is slash and burn agriculture. In Zambia, this is known as *citemene* (meaning 'to cut'), and is described as follows by Kakeye et. al. (2006):

> "At the beginning of the dry season, men go into the woodlands and climb trees to cut off branches in large tree-cutting areas. After these branches have dried adequately, women carry and pile them in the center of the cutting area. At the onset of the rainy season, the wood pile is set on fire, and when the fires have extinguished, a field emerges. In the first year, the villagers plant finger millet and cassava, their main food crops. During the next three years, the field is continuously planted in a rotation of crops, such as groundnuts and beans, and after this time, the field is abandoned and left fallow. *Citemene* fields range from 0.2 to 0.7 ha according to the household composition; the average area measured was approximately 0.45 ha. The tree-cutting area is about seven times larger than the *citemene* field."

In Mozambique, a similar practice occurs on what are known as *machambas*, patches of land approximately 0.5 ha to three ha in size. As with the *citemene* system, after burning mixed cropping is practised in the fields, where maize is sown with a variety of other species such as sorghum, millets, several grain legumes (groundnut, bambara groundnut, beans, cow pea, pigeon pea, among others), cassava, pumpkins, rice and other minor crops (Temudo 2011). These are then farmed for as long as they produce good yields (usually between two to four years) before farmers move on to clear a new patch of land (Herd 2007; Ryan 2009). Under these kinds of systems, where selective cutting is practiced, the period of time for which the land is left undisturbed before it is returned to is usually 20 years, and in clear felled areas, up to 60 years (Chitondo 1996). Historically, this has provided enough time for the full recovery of the forest – research by Ryan (2009) shows that woody carbon stocks in the miombo woodlands recover from clearance after 30 years of abandonment.

Accordingly, it is not the practice of shifting cultivation itself that has created the problem; indeed, it has been practiced sustainably for centuries in both Zambia and Mozambique (Sprague & Oyama 1998; Moore & Vaughn 1994). Rather, it is that the sustainability of the system hinges on the availability of land and the period of time the woodlands are given to recover. Research by Chidumayo (1987; 2002) and Kemp & Chidumayo (1998) for example, has shown that the system has a particularly high requirement of woodland compared to crop production; in order to support a plot of one hectare, a farmer needs to have access to, on average, 28 ha of woodlands. This means that the land's 'carrying capacity' is limited to about three or four persons per square kilometre.

In the last two decades though, demand for land in both countries has increased, and the result is that the fallow periods for slash and burn agriculture have decreased from the usual 20 to as little as three or four years (Kapakele 2006). This is too short for miombo recovery – early studies by (Boaler & Sciwale 1966) indicate that prolonged cultivation of five years or more in the same area represents a critical limit for destruction of rootstock and therefore miombo regrowth potential. Quite simply the productivity of the system has been too low to support the demands made on it. As a result, shifting cultivation has begun changing in many ways at once and is experiencing a trend towards more permanent cultivation. Only the widespread availability of land has staved off a greater crisis (see Jansen et. al. 2008; Temudo 2011). This change from traditional forms of shifting cultivation to more permanent forms represents a critical threat for miombo re-growth potential.

clearing the grass and preparing the fields

stacking the wood in the middle of the cleared area

setting the fires...

... which sometimes rage out of control

the cleared area after burning

early regrowth after burning

preparing the soil for planting

the results of unsustainable shifting cultivation

**Figure 13**: Shifting cultivation practices in Zambia and Mozambique. *All pictures by author*

## Charcoal production

*"Charcoal production is a poor man's business..."*

NL Agency (2010)

In addition to farming many of Mozambique and Zambia's citizens engage in other types of activities such as charcoal production, fishing and the collection of non-wood forest products (NWFPs). These kinds of activities are not mutually exclusive. Research by Mather (2009) for example, finds that fishing and charcoal production activities have a significant positive association with crop income in certain parts of Mozambique. This highlights an important point namely, that it is common for the majority of rural households to undertake non-farm activities in response to (or simultaneously with) their crop production. This diversifies their income streams, giving them additional security in the case of unexpected events such as crop failures. It also allows them to derive an income stream all year round, since so many resource collection activities are seasonal in nature. The most common of these activities is collecting and producing fuelwood in the form of firewood and charcoal.

In rural areas, the dominant form of fuel is firewood. Around 86 to 90 per cent of households rely on it for all their cooking, heating and lighting needs. Consumption patterns vary. In Mozambique, estimates for annual individual consumption are between 600 and 800 kg, and the average figure for the country as a whole is estimated at around 695 kg (WISDOM 2008). In Zambia, the average figure is smaller, with a recent study by Bwalya (2007) estimating a figure of around 370 kg. However, as Kalinda et. al (2008: 63) have pointed out firewood usually takes the form of dead wood, branches and twigs. Even where trees are felled they are done so selectively, and according to quality, and there is very little wholesale clearance of forest areas. Only in very few places where firewood is scarce do people resort to cutting down young regrowth, which they leave to dry before transporting it to the village. Accordingly firewood collection exerts a 'negligible' impact on forest conditions and deforestation (FAO 2001; Chidumayo 1997).

For the millions of people living in Zambia and Mozambique's urban and peri-urban areas however, charcoal is the fuel of choice, replacing firewood as incomes rise. This transition has been described as the traditional 'fuel ladder,' a model which proposes that, as families gain socioeconomic status, they abandon technologies that are

inefficient, less costly and more polluting, (Smith 1987; Barnes & Floor 1996). In this situation, charcoal succeeds firewood, and is then supposed to be substituted in turn by kerosene, gas and commercial electricity as consumers climb up through the rungs. Charcoal represents an improvement over firewood because it has double the energy content, is easier to transport, handle and store, fetches good market prices and is cleaner when burnt (Mulombwa 1998). Or in the words of a Mozambican retailer, "it sells well, doesn't go rotten and children don't steal it."

For the poor, charcoal is particularly important; 98 per cent of low cost urban households are heavily dependent on charcoal as their main source of their domestic energy, and it accounts for about 20 per cent of their total spending. However, as research in both countries by Puna (2008), Drigo et. al. (2008) and Herd (2007) has shown, even as affluence increases households continue using charcoal in significant amounts, due not only to its cheapness and convenience but also due to cultural reasons. Even in households where alternative fuels are used, charcoal is often used as a backup fuel or the main fuel for preparation of certain foods. As a result, charcoal usage in both countries is around 70 to 80 per cent of all urban households and annual consumption rates average between 120 kg and 140 kg per person (Technoshare 2008).

So what makes charcoal a problem where firewood isn't? There are two key reasons. The first is that charcoal production is a very inefficient way to use wood. It is usually done via the traditional 'earth kiln' method, which involves felling trees, crosscutting, building an earth kiln over the wood, slow burning (usually around a week) and then breaking the kiln to recover the charcoal (Chidumayo 1992). Research suggests that this method has low efficiency rate, converting only around 15 to 25 per cent of total wood used depending upon several factors such as tree species, log arrangement and experience (Herd 2007). Producers can also experience kiln failures due to unburned wood or the conversion of wood into ashes. Research by Puna (2008) for example, shows that producers in Mozambique lose an average of five kilns a year, equivalent to over 400 to 500 kg of charcoal per producer. Thanks to these inneficiencies in the production process, urban consumers therefore tend to use much more wood overall than their rural counterparts.

The other problem with charcoal production is the way the wood is harvested. This takes one of two forms. The first is selective cutting, whereby certain trees that provide good

quality charcoal are selected and cut for charcoal production. Traditionally, only logs with a girth greater than roughly 3cm DBH are used and trees will not be cut below 30cm to allow for regeneration (Syampungani 2008). Large tree species (>20cm DBH) with high caloric values are the most preferred, due to the large quantity of dense and hard charcoal they produce. According to local forest users in Mpika in Zambia and in Gorongosa National Park in Mozambique, preferred species in the miombo woodlands are: the Apple-Leaf (*Lonchocarpus capassa),* the Lebombo Ironwood *(Androstachys johnsonii),* the Silver Cluster-Leaf *(Terminalia sericea),* the Leadwood *(Combretum imberbe), Buffalo Thorn (Ziziphus mucronata),* the Rhodesian Copalwood *(Guibourtia conjugata)* and the Velvet Bushwillow *(Combretum molle).*

The other method is clear felling, in which most or all trees in a harvest area are cut down. This is usually practiced in conjunction with slash and burn agriculture, where the farmer will invite charcoal producers to clear a given area in return for the rights to produce and market charcoal resulting from the clearance process (World Bank 2009). Not surprisingly, this is the more destructive form of charcoal production since it results in permanent land use change. The problem is that this practice now predominates; according to Mikael Reina, FINIDA's Chief Technical Advisor to Mozambique's forestry department, the average charcoal producer in Mozambique now clear fells around $50m^3$ of wood to get $1m^3$ of charcoal.

This is thanks to an increasingly commercialised charcoal industry with sophisticated supply chains involving not only producers, transporters and consumers, but also middlemen, consortiums, and wholesalers (NL Agency 2010). Most of this trade takes place informally, with charcoal transported and traded clandestinely in an attempt to avoid authorities, taxation and penalties. In the absence of oversight and in response to increased demand producers have begun disregarding species, girth and height when cutting, resources are exploited all year round and woodlands are given very little time to regenerate between fallow periods. There is also an increasing tendency to use more motorized equipment such as chainsaws for cutting the trees which increase the productivity of the operations allowing the operators to cut more trees in less time (Puna 2008).

a typical charcoal kiln, near Ndola, Zambia

Charcoal for sale by the side of the road, Gorongosa, Mozambique

Charcoal for sale by the side of the road, Mpika, Zambia

Charcoal seller transporting charcoal to Beira, Mozambique

Charcoal for sale at a truck stop in the Copperbelt, Zambia

Charcoal being unloaded from the trucks in Maputo, Mozambique

Charcoal for sale at the markets in Maputo, Mozambique

Charcoal for sale at the markets in Maputo, Mozambique

**Figure 14:** Charcoal production and the charcoal trade in Zambia and Mozambique. *All images are the author's own*

## Fire

Fire is an important land management tool for rural communities in Zambia and Mozambique, who use it as a means to improve socio-economic and environmental aspects of their livelihoods. Uses include the preparation of land for cultivation, improving visibility around settlements and foot paths, keeping away dangerous animals, clearing roadside areas before or after road maintenance operations, management of grazing land, charcoal burning, caterpillar breeding, honey collection and hunting (Zolho 2007; Erikson 2007). Such practices are ancient; in the tropical savannas of Africa, intentional burning has been practised for at least 50,000 years, and miombo has adapted to burning regimes to the point where fire now forms an intrinsic part of its natural vegetative cycle (Trapnell 1959; Rose-Innes 1971; Lawton 1978; Chidumayo 1989; 1997; 2004).Recent research by Ryan (2009) for example, shows that fires every two to three years are necessary to facilitate regeneration and soil nitrification and therefore maintain the observed tree biomass in a typical miombo woodland area.

Accordingly, it is not fire itself that causes deforestation. Instead, the problem is where fires occur either too often or with too great an intensity. This can reduce the stem density, sprout stocking rate, dominance and coppicing effectiveness of most miombo species, and thus affect the normal regenerative potential of the majority of species in the miombo woodlands (Zolho 2007; Ryan 2009). This is what has happened in the forests of Zambia and Mozambique in the last two decades. In Mozambique the average of 5.5 million ha burnt annually between 1982 and 1992 increased to almost nine million ha by 2001 (Taquidir 1996). Likewise, the number of individually recorded fires increased from 51 021 in 2001 to 138 856 in 2007 (UN-FAO 2011). In parts of the country, some fires now start as early as March each year, with intensity and frequency increasing as the vegetation moisture content drops to a low by late August to October. In some cases, fires continue burning until the first rains in November or December (Saket 1999). While similar satellite data for Zambia is unavailable, studies by Chidumayo (1998) have shown that the average returning interval of fire has decreased to an average of 18 months and in some places, to as little as nine months.

Part of the problem is that for most rural communities, the timing of burning is clearly linked to particular livelihood activities. Eriksen (2007) for example, documents the practices of a typical community in the Kafinda Game Management Area in central Zambia. Villagers start burning at the local chief's signal in late August to early

September for caterpillar harvesting. The aim is to encourage an earlier flush of new leaves which caterpillars require for breeding. This is followed by burning in October to clear and fertilize *citemene* fields, and to kill diseases, pests and weeds in the long undergrowth of grass. The dominant practice is therefore to set fires later rather than earlier in the season. However, the higher leaf flush due to higher biomass at this time of year leads to more intense fires (Mulombwa 1998).

Moreover, even in areas where early burning is conducted, recently cut over areas for charcoal and agriculture have high amounts of leftover wood debris. In such instances, even early burning exercises can be fierce and damaging, especially to recovering woodland (Chidumayo 1997). Fire is also used all year round for flushing animals for hunting, smoking out bees for honey and to burn pathways through areas of long grass. The process is self-reinforcing. Burning encourages a taller and thicker growth of grass, which is valuable to local villagers for roof thatching and mats. However, the grass not only harbours pests which then need to be removed, but when it is burned produces vast amounts of combustion material which contributes to bushfires becoming so hot and intense that they can become uncontrollable and "burn with the wind for weeks at a time" (Eriksen 2007: 249). The result is that stressed forest lands in both countries have ended up being further degraded, locked into a vicious cycle of burning, clearing and ever shorter recovery periods.

### A vicious cycle

So far, this analysis has confined itself to describing the effects of each of these proximate causes (shifting cultivation, charcoal production and burning) in isolation. However, the cause-effect mechanisms that lead to the loss of forest area are complex and difficult to attribute to just one factor. As Cuambe (2010: 15) points out, it may be easy to identify a correlation between one of these proximate causes and forest degradation, but it is not easy to prove a direct causal relationship. For example, it might seem evident that intense and unsustainable charcoal production leads to heavy degradation or even complete loss of forest cover; on the other hand, it is also true that charcoal production is often a simple by-product of shifting cultivation into previous forested lands. In this case, a reduction in the demand for charcoal might still do little to reduce the overall deforestation rate.

Accordingly, it makes more sense to analyse the proximate causes of deforestation in Zambia and Mozambique in combination. It is only then that the true magnitude of their effect becomes apparent. Take for example, a primary patch of miombo forest adjacent or close to a rural community. Local users begin by cultivating small plots of land on the edges of the woodlands, concentrating on crops that do not require inputs such as fertilizer, and using traditional methods such as *citemene* to create *machambas*. Encouraged by demand from passing trucks on their way to the urban centres, and requiring additional sources of income due to low yields and the potential for crop failures, users clear more land than is necessary. They then use the surplus for charcoal production. At the same time, they set fires, making the clearing process easier, as well as improving the harvest of other sources of NWFPs such as caterpillars.

Due to increased demand and pressure on forest resources though, the harvesting cycles are shortened and fires become more frequent as people strive to earn a living. They also become more intense as they are set later in the year. Neither the land that is cultivated nor the land that is cut for charcoal is allowed to recover sufficiently before it is cleared or burnt again. At a certain point, the regeneration potential of the forest is exceeded, and the land becomes permanently converted to fields and pasture. Unfortunately, given the lack of inputs and sustainable farming techniques, the now permanently converted land is unable to sustain its users for long, and so the cycle begins again, with users moving to new areas of primary forest with greater crop and charcoal producing potential. It is this therefore – the negatively reinforcing cycle created by the combination of shifting cultivation, charcoal production and uncontrolled fires – that results in the types of permanent deforestation that have taken place in Zambia and Mozambique in the last two decades.

Figure 15: Charcoal for sale on the side of the road near Ndola, Copperbelt Province, Zambia. *Picture by author*

# 5

# The Structural Causes of Deforestation in Zambia

Zambia is one of the most heavily forested countries in Africa, with total cover estimated at close to 50 million hectares, or around two thirds of the country (MTENR 2008). This abundance of forested land means that, of all the countries in the southern African region, Zambia has the largest forest estate relative to population – approximately 3.5 ha of forest land available per capita, compared to 0.2 in Malawi, 1.7 in Zimbabwe and 1.6 in Mozambique. It also means that outside the more urban and peri-urban parts of the country, most of the population lives in close proximity to some form of forested land. Most of this is miombo forest, concentrated in the upper plateaus of the country, and comprising around 80 per cent of the total. Elsewhere, there are closed mopane forests in the south western part of the country, a major eucalyptus plantation in the Copperbelt, and a number of smaller local and regional plantations scattered around the various provinces (Jumbe et. al. 2008).

As discussed in the previous chapter, in recent years Zambia's forest estate has disappeared rapidly. According to most observers, in order to understand why this has occurred one needs to go back to the early 1990s, and examine the impact of structural adjustment programs which changed the nature of the Zambian economy almost overnight. This commenced a process of agricultural expansion and growing demand for woodfuel and charcoal that has continued until today. That process has continued in more recent years thanks to structural factors such as high levels of poverty and high rates of urban population growth, and has been compounded by limited access to electricity and continued reliance on subsistence agriculture for most of the country's poor. I explore these issues in greater detail in the first three sections of this chapter.

In the fourth and fifth parts of the chapter I present an alternative argument, namely,

that the most important drivers of deforestation in Zambia have not been economic or demographic, but institutional in nature. I show how the dual system of land tenure, designed to accommodate Zambia's traditional authorities on one hand and the more formal government agencies on the other, has encouraged landholders to clear forests with little thought to long term sustainability. I also argue that forest management in Zambia is in urgent need of schemes to decentralise forest management, yet vested interests and institutional failures have prevented the Zambian Forestry Department (ZFD) from implementing the necessary policy reforms. I conclude that the resulting deadlock has left the forestry policy space wide open and poorly regulated, and that it is this, more than any other single factor, that has resulted in Zambia's unusually high levels of deforestation in the last twenty years.

## Structural adjustment and agricultural reform

During the 1990s the Zambian economy underwent one of the most sustained liberalisation programs ever conducted on the African continent. By some accounts, the pace and scale of change were as fast, and as uncontrolled as reforms carried out in the Soviet Union during the same period (Mwenechanya 2009). Measures imposed included price decontrols, the liberalisation of the foreign exchange market, the liberalisation of export and import trade, fiscal austerity measures to reduce the budget deficit and control inflation, the adjustment of interest rates and the tightening of monetary policy, reform of the civil service and the privatisation and liquidation of state enterprises (Simutanyi 1996). While many of these had been agreed upon by the previous government in conjunction with the Bretton Woods institutions, under the newly elected Movement for Multiparty Democracy (MMD) they were imposed with far greater zeal and enthusiasm.

The effect on the livelihoods of ordinary Zambians was devastating. Overnight the unemployment rate rocketed, thanks to the downsizing of government (the biggest employer) plus a slew of closures in the private sector. Between 1990 and 1995, more than 70 per cent of the labour force in the mines, telecommunications, electricity and railways was laid off (Rakner 2003). Employment in the mines halved again between 1995 and 2000, and salaries were reduced, transforming employees into the 'working poor' (Fraser & Lungu 2007). This rapid de-industrialisation led to a substantial increase in urban to rural migration as the newly unemployed moved to nearby lands around towns and cities (Potts 2005). Lacking any alternatives, many took up livelihoods such as farming, fishing and charcoal production to survive. Between 1990 and 2000, the number of rural households engaged in agriculture increased by 113 per cent, and in urban areas it increased from one per cent to 12 per cent of total households (Govereh et. al. 2009).

Unfortunately, things were not easy for the new would-be farmers. Historically, the state had lent a strong helping hand in the agricultural sector, managing markets at both the input and output stages, subsidizing production through the provision of smallholder credit, fertilizer and seed and operating a system that offered all producers the same price irrespective of location (Masters & Nuppenau 1993; Collier & Gunning 1999). The government had also provided widespread agricultural extension services in most rural areas to help farmers in identifying markets, adopting new techniques, reducing fertilizer costs and reducing livestock diseases. In the wake of structural adjustment however,

most forms of assistance disappeared. Producer and consumer subsidies were eliminated, price ceilings were abolished and left to be determined by the market, state institutions for the marketing and distribution of maize were dismantled and agricultural extension services were drastically reduced (Thurlow & Wobst 2006).

As a result, the amount of fertilizer imported for distribution declined from over 100,000 metric tons in the early 1990s to less than 40,000 tons in 2000, while prices more than doubled over the same period (Jorgensen & Loudjeva 2004). Productivity declined, with yields falling by 14 per cent between 1981 and 2001, and the area of land under cultivation for maize shrunk drastically, decreasing by 165,000 ha (22 per cent) between 1990 and 1999 (Kapakele 2006). In response, many small scale farmers, especially those in more remote areas, shifted from the production of staple crops in permanent fields known as *faamu* to the production of alternative crops via *citemene* (Holden 2001). Between 1990 and 2000 the proportion of households producing cassava increased from 32 per cent to 55 per cent, millet from 21 per cent to 30 per cent, and sorghum from 10 per cent to 23 per cent (Jayne et. al. 2003).

The reasoning behind the farmers' decisions to switch was fairly straightforward. In 2002/3 a World Bank study was carried out in ten different study sites selected to represent a variety of agro-ecological zones, modes of livelihoods, levels of access to markets, services and infrastructure and cultural/ethnic groups (see Jorgensen & Loudjeva 2004). When asked to rank causes of low crop yields, every community started with the same two: fertilizer was not available on loan and fertilizer supplies were always late or too expensive. Other studies by Kakeya et. al. (2006) and Kapakele (2006) show how, until the mid-1990s, smallholders alternated between *citemene* and *faamu* production but that, following market liberalisation, *faamu* cultivation ceased to be viable in outlying rural areas, and *citemene* became the only alternative. Both studies show that the motivation for smallholders to return to *citemene* cultivation was driven primarily by a lack of money and access to loads for inputs such as fertiliser and equipment. In each case, farmers tended to draw a direct link between these obstacles and the liberalisation of the agricultural sector as carried out by the Zambian government.

## Public sector cuts

For forests, the other important outcome of Zambia's SAP was the drive towards reduced government spending in the form of the Public Service Reform Program (PRSP). Launched in 1993, it had three aims: to make the Zambian public service leaner, to improve human resource management and to decentralise and devolve administrative power away from central ministries in Lusaka to field stations and local government structures (Mulikita 2003). It was one of the conditions imposed by the World Bank, who according to those involved, gave the Zambia government an ultimatum to cut its size to a level where its wage bill did not exceed 8.9 per cent of national GDP (see Makano 2008: 204). As a result 24,000 full time employees were removed from the payroll overnight, while permanent salary freezes were enforced for remaining civil servants.

However, the trimming of civil services was done via a stipulated proportion in each department, rather than by evaluating each area according to need. It meant that the Zambian Forestry Department (ZFD) which had high number of staff (thanks to its large geographical range and the nature of its task), was one of the first to feel the cuts. The ZFD also made an easy political target for ministers looking for savings, since forests were thought at the time to contribute relatively little to the economy and viewed as resource 'sinks' rather than 'sources.' Accordingly, the ZFD was forced to undergo major readjustments, moving its headquarters from Ndola to Lusaka, downsizing its departments, cutting back on research and retrenching hundreds of employees. In 1991, total staff numbered just over 1500; by 2000, only 883 remained.

The disappearance of field staff, cut from 1273 to 478, was particularly damaging. These were the primary custodians of the country's vast forest reserves, responsible for the daily monitoring and enforcement of forest rules and regulations and in most cases, the only contact between the ZFD and the communities that lived there. As Lewis Bangwe, a former ZFD employee put it to me, "the idea of structural adjustment was to cut the fat out of the civil service, which sounded great at the time. Unfortunately for the Forest Department, they ended up removing all the muscle and none of the fat." Once local communities saw that nobody was directly responsible for forests their natural tendency was to use them unsustainably, thanks to the pressures brought about by the changes in the Zambian economy. There was no control over what was allowed to be extracted, how much, or when it could take place.

Reductions in government expenditure also translated into low allocations to forestry programs, effectively curtailing any new initiatives and hobbling the activities of remaining field staff. The problem went all the way to the top – according to Fabian Malambo, a former district officer, in 1997 the then president Frederick Chiluba visited a forest reserve which had been settled by a local community and remarked "I don't see any forest here, all I see are cabbages!" ZFD employees complain that these attitudes continue today. Forestry, they say, is simply not a priority for government. Money for vehicle maintenance and fuel allowances is non-existent, and staff are forced to revert to bicycle or foot to get around.

Meanwhile, at headquarters, managers and administrators have come under increased pressure to de-gazette forest reserves, especially those near urban areas (Njovu 2004). Any attempt to regulate or stop illegal forest settlement invariably meets with opposition thanks to the machinations of local politicians, who have a strong interest in allowing their constituencies access to an easily accessible and cost free resource. In effect, forests have been politicised – once people move into forest, they create a ward (i.e. a political entity) with stronger voice than the ZFD, whose ability to resist is minimal. Forest guards, unwilling to incur the displeasure of their superiors, and fearful of being retrenched in a country where the unemployment rate remains at over 50 per cent, can do little except watch as the forests are slowly destroyed.

## Access to and usage of different energy sources

For those Zambians either unwilling or unable to farm, or looking to supplement meagre incomes, charcoal production offers an ideal alternative. The average per capita income from charcoal production in Zambia has been shown to be almost five times higher than that from farming (Serenje et. al. 1994; Chidumayo 2001). Cross border trade also offers lucrative opportunities – according to Chilufya Kapwepwe, a former MP who now runs a local environmental NGO, the price of the average bag of charcoal in neighbouring Tanzania and Kenya can be up to four or five times higher. In 1997, the government estimated that 41,000 rural households were employed full time in charcoal production and an additional 4,500 people were involved in transportation, marketing and distribution (GRZ 1998b). However, as Jumbe et. al. (2008) have pointed out, few rural households specialise in one full time activity and it is therefore likely that the total number of households benefiting financially from the charcoal industry is much higher.

For example, according to a detailed study undertaken in 1999 and 2000 for the Charcoal Potential Southern Africa Program (CHARPOSA), in just one district, Chongwe, 9,000 households were involved in charcoal production and made US$ 2.1 million through the supply of 61,000 tons to Lusaka markets in 2000 (Chidumayo et. al. 2001). According to one official most became charcoal producers during the previous decade because of the "low profitability of crop production and lack of capital for farm inputs and machinery." Demand for this resource has been driven by the Zambian population's continued reliance on woodfuels. This is certainly the official line taken by the ZFD, whose head, Anna Masinja Chileshe, stated in 2001 that, "the dependence on woodfuel by most households increases pressure on the forests while alternative energy sources are not immediately available" (Chileshe 2001: 13).

One of the main reasons for continued reliance on woodfuels is the lack of access to electricity. Only 22 per cent of Zambians are officially connected to the grid, up from 13.8 per cent in 2000 and from less than 10 per cent in 1994 (Brew-Hammond 2010). In rural areas, the problem is even more marked: only 3.2 per cent have access, up from 1.7 per cent in 2004, 1.5 per cent in 2000, and 0.8 per cent in 1990 (UN-REDD 2010; Haanyika 2008; GRZ 2000). Supply, which is the responsibility of a parastatal, the Zambian Electricity Supply Company (ZESCO), comes primarily from the three main hydroelectric stations: Kariba North Bank (600 MW), Victoria Falls (108 MW) and Kafue Gorge (900 MW). However, capacity is not an issue – the country has an installed

capacity of 1,774 MW, a peak load of 1,028 MW, and undeveloped hydropower potential of over 6,000MW. Nor is it a result of a continued lack of attention to the problem – electrification has featured prominently in development plans throughout the last 20 years.

Instead, the problem is that the task facing ZESCO is simply enormous (Haanyika 2008). Zambia is a large country, with low population densities, and long distances from the major hydropower stations located in the southern part of the country to most rural areas. Those challenges are compounded by high poverty levels, which have a significant bearing on electricity consumption and the capacity of rural dwellers to pay for new connections and on-going consumption. Actual usage of electricity is likely to be far lower than official figures, especially in rural areas, where it is used primarily for community centres, schools and clinics. Most individual households either do not have electrical appliances such as lights and stoves in their houses, or cannot afford the bulk payments required for electricity consumption. These households therefore continue to rely primarily on woodfuels for their energy needs.

Poverty also contributes to increased vandalism of electricity infrastructure, while limited technical skills to construct, maintain and operate rural supply systems affect the rate of electrification and the reliability of electricity supply. Others, such as Ianchinova & Lundstrom (2008), suggest the inconsistency between excess supply and poor access is due to the dominance of the mining industry in the energy sector, which has discouraged the expansion of electricity infrastructure to other productive sectors. This continued lack of access, combined with the relatively high cost of electricity and petroleum based fuels means that woodfuels, and especially, charcoal, look likely to continue to be the dominant form of energy supply in Zambia for some time to come.

## Land tenure

In Zambia, land is administered under what is known as a dual tenure arrangement, with provisions for both private property and customary law. This is because, under both the colonial and post-colonial governments, land could not be bought or sold, and was instead administered either by the state or by traditional authorities. One of the first priorities for the new government following the transition to multi-party democracy therefore, was to introduce an arrangement allowing for the sale of land and private property, in line with the overall move towards a market driven economy. Accordingly, in 1995, the Land Act was passed, abolishing the old categories of 'reserve' and 'trust' land and combining them into customary areas. Customary land comprised 94 per cent of the total, and was intended to be left to evolve according to local traditions and conditions. The remainder was left as statutory land whose allocation would be subject to statutory law and whose prices would be determined according to market forces (Adams 2003). Not surprisingly this land, although only a small proportion of the total (6 per cent), is the most valuable and productive land in Zambia, concentrated in and near the cities, along the railway line between Livingstone and the Congo border, in the mining areas of the Copperbelt, and in certain productive farming areas (Ianchinova & Lundstrom 2008).

The 1995 Act was passed quickly and with almost no consultation, despite considerable opposition at the time from traditional leaders, civil society, and other key stakeholders who argued that it would disadvantage poor people and undermine the authority of traditional leaders (Norfolk, 2004). In practice, the role of the chiefs did not actually change much. They still continue to grant rights to occupy and use all land in customary areas, impose restrictions on its use for activities such as cultivation or the grazing of animals, and resolve disputes with the help of groups of elders (Adams 2003). Under customary law, individuals can obtain land via the clearing of virgin bush, as a gift, in exchange for goods, or in exchange of services and marriage. However, while they can use it and pass it on to family members through inheritance, *de facto* recognition extends only to protection of use and occupancy rights. There are no formal documents of land ownership, no taxes paid and users have no legal management privileges (van Loenen 1999). Insecurity of tenure is therefore a problem – many of those on customary land have expressed a desire for formal titles in order to avoid dispossession, to protect fixed investments and to ensure transfer to heirs (Smith 2001).

By contrast the system governing the rights over statutory land is administered by the

central government under English statutory law, mortgageable and subject to taxation, and distributed in 99 year leases. The procedure for acquiring a lease though, is long and complicated. Applicants are required to submit a plan for approval by the local municipality, who determines whether the land is unoccupied. The application is sent to the Ministry of Lands, and the applicant is then required to hire a licensed surveyor. If the Surveyor General approves the surveyor's plans then a lease is given for 99 years. Leasehold tenure can also be acquired by converting customary land, but this requires the resident chief's approval, and is limited to 250 hectares (GRZ 1995b). All leases under statutory law constitute private ownership, and lessees hold title for the land as well as usage and exploitation rights for its resources. However, the Act allows for titles to be retracted when subsurface resources of 'national significance' (i.e. valuable minerals) are discovered (UN-REDD 2010).

Crucially, under the Land Act of 1995, all land is vested in the President on behalf of the people, thus creating a strange hierarchy, with customary land recognised, but given a lower status. According to some, such as Ville Luukanen, an economic advisor at the Embassy of Finland, this means that 'dual' land tenure is little more than a myth. Granted, permission to occupy the land is needed from the chief, but ultimately titles are granted by the Ministry of Land. This leads to a patriarchal and outdated system of land management that allows politicians to "use land as a sop to chiefs and keep them happy by buying votes." It also creates an ongoing tension between commercial agriculture and tourism, with demands for strong property rights, and a lack of support for the same founded on customary land rights (Metcalfe & Kepe 2008). Others, such as Jean-Michel Pavy, a natural resource expert at the World Bank, insist that the question of whether dual land tenure is a problem depends on traditional authorities. Where they are educated and tend to use their power wisely it works well. However, in the absence of checks and balances it is open to abuse. The question therefore, "is not whether the traditional system has value but how to modernize it."

The continued lack of formal property rights in customary areas has resulted in a number of perverse outcomes for Zambia's forests. For example, research by Unruh et. al (2005) shows how migrants moving to new areas will tend to clear more land than is necessary for fear that the local leadership may subsequently take back any uncultivated land. Where all land has already been allocated, new migrants arriving in the area looking for land may approach the local leadership and make the case that patches of apparently unused forest land should be taken from the current holder and allocated for

clearing by new migrants instead. Existing holders of forest patches in customary areas are therefore encouraged to clear them as quickly as possible so as not to incur allegations of non-use by others seeking land. Such insecurities are not confined only to customary land. Backlogs at the Ministry of Land for formal land applications are anywhere between four months and two years, and there is a notable lack of surveying facilities – Zambia has only 13 licensed surveyors, administering many thousands of applications a year. Government has attempted to circumvent these problems by granting 14 year leases based only on a sketch plan, which does not require a surveyor. However, this has led to increased boundary disputes because of the inaccuracy of plans and the backlog of cadastral surveys.

The overall pressure this places on government departments is intense, especially given the political importance of land issues. Also, since land has not been released quickly enough, especially in urban areas and adjacent to forest reserves, informal and illegal forms of squatting have proliferated, and are allowed to survive due to political pressure. Moroever, if an individual buys a piece of forested land and subsequently fails to 'develop' it (i.e. by cutting down the trees) then it can be repossessed. Under the current land law therefore, using a forested property for beekeeping for example, which requires trees, would not count as development. As one environmental activist put it to me, the mindset is that "this place is empty because there are only trees here." It means that under the current system of land management, development works against sustainability by definition as well as in action.

## Forest governance and legislation

Responsibility for the management of Zambia's forest resources lies with the Zambian Forestry Department (ZFD). The ZFD traces its origins back to a decision by Zambia's colonial government in 1948 to establish 181 national and 300 local forest reserves, covering almost nine per cent of the total land surface of Zambia (Makumba 2002). A Forest Policy was drawn up and a Forestry Department was established to look after the reserves, with the emphasis on forest protection and management, forest surveys and administration. In 1965, the Policy was updated, and the Forestry Department was renamed the Zambian Forest Department (ZFD) and divided into two main parts – the provincial field organisation, and the specialist divisions (Forest Management & Plans; Beekeeping; Forest Products; Forest Silviculture; Training; and Provincial Management). In the following years ZFD offices were established in every district of Zambia.

This structure was formalised by the Forests Act of 1973. It stated that forests in a legal context are those occurring in state reserves, customary land and on privately owned land, and that all trees on state and customary land are vested in the President on behalf of the people. In practice, the President's authority was vested in the Chief Conservator of Forests (CCF) in Ndola. That authority was delegated in turn to provincial officers, responsible for all forestry activities at the provincial level, and then to individual district offices comprised of a chief officer and a staff of extension assistants, forest rangers and forest guards who were supposed to carry out patrolling, licensing and general protection duties. Access to and management of reserves was supposed to be strictly controlled by district field staff, while indigenous forests on customary land were managed in terms of extraction through concessions and licensing.

The use of forest products by local users was regulated by local by-laws and administered by local authorities, but these were legally powerless to control use by outsiders if they had licenses issued by the ZFD. Forest management therefore focused either on plantations or the exclusive protection of forest resources with forest production as a secondary aspect. Traditional authorities and local communities were given very little say as to how forest resources should be managed, and forest dwelling communities were given no rights over resources at all. As Lewis Bangwe, a former forester and current food security expert at the African Development Bank put it, the ZFD was designed as a policeman and as a protector of natural forests, but not to engage in outreach and

collaborative projects.

Over time however, as institutional sclerosis under the one party state crept in, the ZFD became run down and its systems too inflexible to deal with the growing threats to the country's indigenous forests (Makano 2008). By the 1990s, it had become clear that a new arrangement for the country's forest sector management and regulatory organisation was required. Accordingly, in 1995, as part of a larger process of review for the entire environmental sector, the Zambia Forestry Action Programme (ZFAP) was conceived, with the stated goal of providing for "the national management and conservation of forest resources to enhance the contribution of the forest sector to social and economic development, poverty reduction and the improvement of food security" (GRZ 1995a: 2). The ZFAP also conducted an extensive review of the Forest Policy of 1965 and Forest Act of 1973. One of its key recommendations was to begin the process of empowering those living close to or involved with the forest resource base with much greater ownership of and responsibility.

This coincided with the Provincial Forestry Action Plan (PFAP), intended to support and improve the ZFAP process by developing new forms of revenue collection and sharing in partnership with local communities (FINIDA 2005). To this end, it created three forestry management plans for the Luapula, Copperbelt and Central Provinces. In 1998, the Zambia Forest Policy (ZFP) of 1998 was released, incorporating recommendations from the ZFAP lessons learned under the PFAP. It was based on five principles – sustainable forest resources management, capacity development, formation of partnerships, private sector involvement in forestry development and the promotion of equitable participation of all sections of the community (WWF 2004). Crucially, the ZFP committed Zambia to the introduction of participatory approaches to forest management. It stated that all stakeholders and particularly communities should be involved in the management of forests, that the role of traditional rulers should be recognised, and that partnerships with local users and the private sector in preparing management plans should be encouraged. Its guiding principle was therefore the idea of inclusiveness (WWF 2004).

This principle was formalised by the 1999 Forests Act, which provided a general basis for the sharing of forest revenue between the government and local communities. In order to achieve this, the Act mandated the establishment of a Zambia Forestry Commission (ZFC) to take over the responsibilities of the ZFD, and the creation of Joint Forest

Resource Management Areas (JMAs) to be managed by Village Resource Management Committees (VRMCs), comprising community, NGO and private sector representatives. The legal guidelines were far from perfect. For example, existing regulations for the handling of government funds were supposed to be scrapped entirely once the ZFC was in place. However, there was no provision to allow new forms of licensing and revenue collection by communities, a requirement which donors suggested was the only feasible practical option to capture the mostly decentralised, very small scale forest production by people in rural areas (FINIDA 2005).

There was also no mechanism for harmonising structures between sub-sectors – joint forest management (JFM) was potentially available not only to communities living in national and local forests and open areas, but also to those in game management areas (GMAs) bordering national parks. It meant that in theory, there could have been two parallel structures with similar functions operating side by side within GMAs – an almost certain recipe for disaster (GRZ 2005). Even so, the 1999 Forests Act was a vast improvement over its predecessor. The 1973 Forests Act was written on the assumption that the ownership, control and management of specified forest areas could be delegated to other persons or authorities only should the CCF approve it (Chunduma 2009). However, it contained no enabling provision for the transfer of ownership, meaning that in practice all responsibilities remained vested in the office of the CCF. Moreover, under the old arrangement, delegated authority did not apply to open areas, leaving a significant part of the forest estate outside the ZFD's jurisdiction and thus without any kind of formal institutional arrangement for forest management. This situation embodied centralised forest management, in which government had absolute power over all aspects of forest management. There was no 'participatory', 'collaborative' or 'joint' forms of management whatsoever.

Resolving these shortcomings was the new Act's strength – it encompassed the principles of participatory forest governance in an attempt to readdress existing management inadequacies. The newly proposed ZFC would be able to operate semi-independently of government, with its own stream of revenues, and therefore free from the political strictures of budgetary allocations. In this respect, it accorded with the government's overall developmental policy of decentralisation. The 1999 Act also harmonized forestry with other pieces of legislation, and incorporated provisions for international agreements and conventions (WWF 2004). The proposed plans had also become increasingly urgent. In 1997, the ZFD had been internally restructured in response to the

cuts mandated by the World Bank's Public Service Reform Program (PSRP). Many of the department's most experienced and qualified staff had been forced into early retirement or, anticipating the cuts, had left for better paid and more secure work in the private sector and with development organisations and international NGOs.

The effects of this restructuring were felt almost immediately. Most employees were now confined to urban centres, funds were not available to support practical forest management and patrolling, and most seriously of all, the department suffered an abrupt loss of institutional memory (Makano 2008; FINIDA 2005). For those left behind, uncertainty and low morale bred growing disillusion, and there was a deep sense of frustration arising from the perception that many of the department's best employees had been lost because of political manoeuvring. The restructuring entailed by the PRSP had also resulted in a shift in emphasis from forest management to forest extension. Headquarters were moved from Ndola to Lusaka, and the former divisions were hurriedly disbanded and restructured into just an Extension and Research Branch. These were fields that had formerly been regarded as support to the more important activities of the main divisions. Now, they had been placed at the forefront of the ZFD's strategy.

Thanks to this strategic shift the first employees to face the chop were forest guards, the first line of defence for Zambia's forests. According to Royd Vinya, a former forestry district manager, numbers shrank from about two to three guards per reserve to only two to three guards per district, wholly inadequate for protection. Many guards were actually encouraged to become redundant, offered attractive redundancy packages, and replaced by a smaller number of more qualified (at least, on paper) extension assistants. Most however, did not have the required training – according to Makano (2008), only 47 per cent of the new assistants had experience in forest management while only 26 per cent had done forest extension work. In terms of skills, 40 per cent were trained in forest management, 20 per cent in forest extension and only 10 per cent in forest research. Restructuring had thus taken place with little or no thought towards experience, training and resulting placements.

The 1999 Act offered a solution to many of these problems. Participatory approaches to forest governance could make up for the lack of monitoring on the ground, and also offered the potential for significantly increased revenues from small scale forest industries. One suggestion for example, was a two tier system for revenue sharing. For small scale collection and harvesting of forest products, communities would issue

licenses and collect revenue, and remit 30 per cent to the ZFC. The issue of large scale concessions and management of payments would be done by ZFC, with the community ensuring that license conditions were adhered to. The ZFC would remit 70 per cent of revenue back to JFM communities (see FINIDA 2005: 19).

According to a number of former employees, within the department itself anticipation was also high, since it was felt that the new ZFC would implement a new level of professionalism, generate and allocate more resources to forest management, increase capacity, improve communications and help reach out to other stakeholders. Unfortunately though, despite being passed in Parliament and endorsed by the Zambian Cabinet, the Forestry Act of 1999 was never implemented, due to a failure to issue the required commencement order to put it into effect. Today, more than a decade later, the Forest Policy of 1998 and the Forestry Act of 1999 remain dormant, and the forests and forest reserves of Zambia are still managed under the Forest Policy of 1965 and the Forest Act of 1973. The result is that the only institution tasked with managing Zambia's forests has effectively been left operating in limbo, paralysed by premature restructuring, budget cuts, uncertainty over its future and an increasingly demoralised staff.

## Institutional paralysis

In the years following the non-implementation of the Forests Act, the ZFD has become the home of 'office foresters' instead of 'forest officers,' lacking a clear vision or purpose, and rarely visiting the field to acquaint themselves with events on the ground unless prompted by the prospect of per diems and subsistence allowances (Makano 2008). Staff technical skills are underutilised, and poor planning has led to the absence of essential operational tools. Most forest reserves for example, are supposed to have management plans, but none exist, and without them, district offices cannot act properly. There is no coordination between extension research and policy implementation branches, and within the research division itself there is often a breakdown between good research plans and subsequent forest based actitivities. Similarly, coordination between financial and field staff is poor, and there is very little communication and sharing of information between senior and mid-level management.

At the top level, there is the Director, Chief of Research and Chief of Extension, but the relationship between the three is not good. The existing director has been in charge since 1995, after her predecessor was 'retired' because of sticking too closely to existing law on forest evictions. Although convicted of corruption in 2003, she has been returned to office thanks to political connections. She now spends more than half the month travelling to conferences on lucrative per diem contracts, and because she has 'iron control,' there are constant decision making delays. Clientelism is rife – according to a number of former employees, transfers and promotions are conducted according to personal relationships with the leadership, with little thought given to matching skill sets to the functions of an office. Junior officers are assigned responsibilities supposed to be undertaken by their superiors in exchange for some favours, and with the promise of future promotion, undermining confidence and morale. Dissenting views are dismissed, and often result in transfers or exclusion from decision making processes. The result is that the Department "has cultivated an ideal ground for a frustrated, disoriented and de-motivated labour force" (Makano 2008: 298).

The effects of this institutional and legal paralysis on the actual day to day management of Zambia's forests cannot be understated. For example, Emmanuel Mutamba, the district officer charge of the Mpika district in northern Zambia is responsible for two local and six national reserves, spread over an area twice the size of Wales. To do this, he has a staff of one part time forester and one office assistant, and one vehicle, a Toyota

Hilux, but no fuel allowance. When I asked him how much he would need to cover the area effectively he suggested around 500 litres (roughly US$700 worth) of diesel per month. There is almost no prospect of this money coming from ZFD headquarters, and instead he is forced to catch lifts with local NGO groups, or to use his bicycle. He said that the continued existence of the 1973 Act was a big problem, because it speaks of 'Forestry Officers' yet such a category no longer exists. This means when he attempts to prosecute offenders he is often told by local judges that he has no legal jurisdiction to do so.

He also complained about the perverse system of license fees, which were hiked by the government to K162,000 (around US$30) for 10 bags in 2008 in an attempt to combat illegal charcoal production. However, since the total retail cost of a bag is only around K20,000 (US$4) in Mpika, as opposed to around K90,000 (US$18) in Lusaka, and the fine for transporting charcoal without a license is K45,000 (US$9) it makes more sense for producers to risk prosecution than pay the license fees. In a 'good' month, he says, he probably receives around K900,000 (US$180) in fines, but this creates a lot of bad blood between him and the community and makes his job much harder. He says that the government "has been addressing the effects, and not the root causes."

Even in relatively more affluent districts such as Solwezi, the ZFD is struggling. Rachel Manda, the officer in charge there, has a staff of one driver, nine foresters and seven general workers, and the use of two vehicles. With this, she is required to cover 23 national reserves and one local reserve. There is no fuel allowance. Revenues come in from firewood, timber and charcoal licensing, as well as fines, but this all goes straight to central government, who distributes funds back to the provincial offices, and then back to the district office. She complains that by the time funds reach district level, there is nothing left. Accordingly, she is forced to improvise by developing relationships with the mines and local development organisations operating in the area.

However, this has created a quandary, since the mines have started encroaching on local forest reserves in order to build more infrastructure and to create settlements for their workers. Thanks to the influx of people looking for mining jobs, all council and customary land has already been taken, and encroachment into forest reserves is becoming increasingly commonplace. She says she is better off allowing this to go ahead and then fining the mine, rather than asking their workers to leave the forest, since she is so strapped for cash. She also complains about the low salaries of forest officers

compared to their agriculture and fisheries counterparts – hers is less than K2,000,000 (about US$400) a month. Extension officers receive even less, and have no accommodation when visiting substations, instead having to organise their own or sleep in tents.

## The failure of joint forest management

The shortcomings of forest governance in Zambia in the last decade are perhaps best exemplified by the failure of the second phase of the Provincial Forestry Action Plan (PFAP II), which took place between 2000 and 2006. Funded by Finland, it was intended to build on the success of PFAP I by rolling out Zambia's first examples of JFM in seven pilot forest areas. It was created on the assumption that the Forest Act of 1999 would commence – indeed, according to Elizabeth Ndhlovu, an official at the Finnish Embassy who was involved in the process, this had been one of the pre-conditions during discussions between donors and the government. Initially a temporary delay had been predicted, and so a Statutory Instrument (SI 52) was created in order to provide a legal framework while the 1999 Act was still in abeyance. However by 2005, after almost a year's delay in approving a draft Statutory Instrument to replace SI 52, the Ministry of Justice declared that the legal framework for JFM was not possible given the non-commencement of the 1999 Act. They also stated that the SI 52 of 1999 should never have been passed in the first place.

With the PFAP II scheduled to end very soon, donors attempted to try and find a way forward using the 1973 legislation. This was partially successful – in 2006, a new Statutory Instrument (SI47) was passed in an attempt to provide a replacement regulatory framework for JFM, and the Plan was extended for a further 18 months. However, there were still no allowances for revenue sharing that would enable piloting of JFM as agreed with communities. Local communities in the pilot areas could be assigned the means and measures of control and management for a forest area, but were not allowed immediate access to monetary benefits. Instead, monies continued to be collected centrally. They first came to the district officer, were then sent through to headquarters and on to the Ministry of Finance. Once they had been approved they were then supposed to come back to the to the MTENR, then the ZFD, and finally back to the communities via the district offices.

Not surprisingly, communities were not prepared to operate like this, since they knew what would happen to money that changed so many hands on its way back to them. They therefore hid stocks, withheld payments and generally refused to cooperate once the financial arrangements were made clear. In some cases, the pilot JFM projects did more harm than good. For example, Felix Njovu, a lecturer on forest economics at the Copperbelt University told me the story of how 20 acres had been set aside for a

community in Shibuchinga, in the Copperbelt, for a government run program to train the community in forestry practices. The project was only funded to last six years though, and training only happened in the final two years, by which stage the project was ending. After the years of promises, the lack of tangible benefits left many in the community disappointed, and determined not to work the ZFD ever again.

According to Marja Ojanen, FINIDA's Head of Environment and Natural Resources, the lack of benefit sharing arrangements doomed the PFAP II from the start: it meant that a governance structure was piloted, but without the necessary financial arrangements to make it work. In the end, the outcomes were limited to JFM plans for six forests in local reserves, one on customary land, 'capacity building' in 45 villages, guidelines for JFM planning and implementation, a 'lessons learned' document and a tentative model for collaborative forest management. The financial model proved to be completely unsustainable – each project ended up costing an average of €13,900 per community or €285 per household, compared to annual per capita income of around €300 per year. In terms of local economic development and livelihoods, the impact was negligible. And most importantly, the PFAP had little to no effect on actual rates of deforestation – as the program completion report stated, "it can be assumed that any degradation of forest resources has thus continued at its normal pace, and hence the conclusion that PFAP impact has been neutral on the status of forest resources" (FINIDA 2005: 25). It was made clear in the same report that that failure was primarily institutional – without the implementation of the ZFC or the legal backing for JFM and the necessary benefit sharing arrangements, there was never any prospect of success.

Why then, despite the continued managerial and programme failures, and in the face of the seemingly obvious need for change, did the MTENR never issue the commencement for the 1999 Forest Act? The decision seems strange given the 1999 Act had both parliamentary and executive approval, and as the years have gone by, increasingly perverse considering the Department's own complaints about under staffing and lack of resources. After all, one of the key justifications for JFM was that it would reduce operational costs by involving forest communities. The official line, according to Deuteronomy Kasaro, a current employee at the ZFD, is that the Act's non-commencement was due to concerns about the financial viability of the ZFC. Apparently the experience of ZAWA, created around the same time to manage the wildlife sector, had raised a number of concerns since it had required substantial state funds in order to stay afloat. Officials were also worried about retrenchment, trade creditor and startup

costs associated with the ZFC (Pope 2006). There were therefore a number of doubts about changing a fully fledged government department into another semi-autonomous parastatal. And, since the formation of the ZFC was attached to all other provisions in the Forest Act, including JFM, none of them obtained regulatory approval.

However, perceptions about the ZFC's financial viability were driven by the ZFD's obsession with forest based activities rather than the potential for revenues from actual products. A good business plan for forests would have easily allowed for the development of a self sustaining commission if the ZFD had been willing to look at a complete revamp of the way they conducted operations. As a number of former foresters pointed out to me, a vast potential income stream in the form of both wood products and NWFPs is available, provided it is administered and collected in conjunction with communities. Indeed, as Ephraim Shitima, a mid-level manager at the MTENR pointed out, the ZFC was not only viable, but had a huge opportunity, since the ZFD is the only department in the MTENR that reaches all the way to district and village level.

Moreoever, although it is true that the ZFD receives far less from the Treasury than other comparable productive sectors such as agriculture, a lot more has come in from donors and external funding. The operational budget for PFAP II for example, was €5.88 million, several times greater than the ZFD's entire budget. It provided direct training support in JFM to many of the ZFD's staff, and provided badly needed vehicles and computing and field equipment to the ZFD to enable it to undertake its basic functions. According to one former manager, there is now greater capacity at the ZFD than ever before; funding problems within the Forest Department are therefore not about lack of capacity, but a lack of distribution.

The suggestion that the ZFD did not want to follow in the footsteps of the ZAWA is also disingenuous. According to Jean-Michel Pavy (World Bank), the ZAWA, despite some severe problems, is still light years ahead of the ZFD in terms of management. There are now more protected areas in Zambia and game management has improved throughout the country. The ZAWA itself functions perfectly well as an institution and has excellent capacity, but has not been given support from government because it is semi-autonomous. This has meant it has had to survive by relying on revenues from wildlife and hunting rather than from game parks. As Winnie Musonda, a UNDP advisor put it, "they might be broke, but they've done their job properly." Financial concerns and the experience of the ZAWA were therefore poor reasons for terminating the ZFC.

FINIDA had even offered to pay all retrenchment and subsequent rehiring costs for the proposed ZFC and approval had been granted by those in charge of budgets and at the highest levels of government. According to one official, central government even went back to the ZFD in 2006 and said "let's get this passed," but the leadership refused.

This last point suggests the most likely reason for the non-establishment of the ZFC – that it would have threatened the autonomy and jobs of those in charge. Donors were requesting a more professional unit, able to utilise the forest resource to its maximum potential. They also wanted to get rid of corruption, and demanded accountability. This is what had happened via the donor driven ZAWA process – and according to Davison Gumbo, head of CIFOR in Zambia, the leadership of the ZFD had determined not to make the same mistake again, preferring to retain the status quo of a traditional civil service entity because of the perks involved. Donor funds to the environmental sector for example, are plentiful, and travel to the spate of international conferences and meetings is lucrative and glamorous. Ultimately, the leadership of the ZFD could not recommend its own removal, and institutional rules and internal power plays and politics within the Department and the MTENR allowed them to delay the decision indefinitely.

For the foreseeable future, the current configuration of power and interests within the ZFD and the MTENR means that Zambia is likely to carry on running behind the problem of deforestation. So long as the status quo remains convenient for those with decision-making power, this situation will not change. The prospect of a ZFC is effectively a non-starter as well, since it would cost more to implement today than it did back in 1999. The government is therefore now looking at changes to policy and legislation again, and in this regard, commissioned a re-drafting of the Forest Policy in 2009. Once again, this document incorporates JFM principles and recommends wholesale changes to the way in which the ZFD runs. The pattern continues though; the document has remained in draft and has subsequently disappeared, with the ZFD's leadership now claiming it needs to wait for policy guidance on the UN-REDD+ forest program before going ahead.


Figure 16: Zebra in miombo woodland, *Equuus burchelli*, Northern Zambia. *Image courtesy Stephen Robinson / WILDFOTO*

# 6

# The Structural Causes of Deforestation in Mozambique

In this chapter, I examine Mozambique's record on deforestation, beginning with the massive resettlement process that took place following the end of the civil war in 1992. In the years that followed, demand for charcoal and land for agricultural smallholdings increased drastically as people returned to their rural homes. This coincided with structural adjustmet reforms that were designed to improve, amongst other things, the efficiency of the agricultural sector. However, while this has resulted in an increase in overall production in the last 20 years, productivity has declined, meaning more people are farming more land, less efficiently. The effects of this agricultural extensification have been compounded by a growing charcoal trade, driven by poverty, a lack of alternative livelihoods and the continued lack of access to electricity in urban areas of Mozambique.

Forest governance during the immediate post war period has focused on the reconstruction of institutions and the passing of legislation, which culminated in the passage of the Forest Act of 1999 and the Lands Act of 2002. A spate of environmental legislation was also passed, setting up a dedicated ministry and mandating environmental impact assessment for all major developmental projects. However, the enforcement and the implementation of forest laws since then has provided some significant challenges. This is partially a result of the institutional arrangements for forest governance – the National Directorate of Land and Forest (DNTF) is housed within the Ministry of Agriculture (MINAG), and therefore relies on it for funding.

Nevertheless, the existence of strong policy guidelines and progressive legislation has stopped the worst depredations. The DNTF has a clear mandate, and provincial officials have guidelines to follow on licensing, export quotas and the granting of concessions and leaseholds. There have also been some encouraging advances in decentralisation and the implementation of CBNRM programs. In recent years, new challenges have arisen in the

form of illegal logging by foreign firms; however, as yet this is not a major threat to the health of Mozambique's forests. The result is that while deforestation is still occurring at unsustainable levels, the problem is not as severe as it would have been in the absence of progressive legislation and clearly defined roles and guidelines for those in charge of forest governance.

## Post war agricultural expansion

Between 1977 and 1992, Mozambique suffered one of the most devastating and protracted civil wars in African history. In fifteen years, more than a million people were killed, and more than six million were displaced either as refugees or to the relative safety of cities, the coastline and major transport corridors (Hanlon 2010). Most of the country's transport infrastructure such as roads, railways and bridges was destroyed or abandoned, and economic activity ground to a halt. By the end of the war it was estimated that the country's GDP was around half of what it would have been in the absence of conflict (UNICEF 1989). In the immediate aftermath, rural areas saw an influx of many returning refugees; according to the United Nations, these numbered around 1.7 million people from six different countries (UNHCR 1996). The former refugees faced considerable challenges; entire villages had disappeared during the war, and much of the old colonial infrastructure had been either destroyed or had fallen into ruins. There were also conflicts over land and natural resources between former refugees and demobilised soldiers who had remained in the vicinity of their dismantled bases (Hatton et. al. 2001).

Most rural migrants were forced to rely almost immediately on subsistence agriculture. However, they faced an uphill battle. The workforce had been drastically depleted, and in some places farm productivity had dropped to as little as one fifth of the regional average (Bruck 2005). The network of small *cantinas* that had existed in the colonial period for the purposes of bartering, purchasing inputs and acquiring credit had been almost completely destroyed, and farmers were forced to travel long distances to local markets instead (Norfolk 2004). Indigenous knowledge and traditional natural resource management systems were also generally weaker, as the new generation had been brought up away from the land. Initially, there was hope that the aid agencies pouring into Mozambique in the wake of the war would help, as they had professed great concern for the protection of natural resource and for reviving agricultural production. However, from around 1996 onwards, donor concerns shifted away from agricultural productivity towards social sectors, primarily in urban centres, leaving marginalised regions out of the picture (Wuyts 2001).

It was decided instead that the reconstruction and rehabilitation of the agricultural sector should be left to market forces in line with the Economic and Social Rehabilitation Programme (ESRP) being implemented by the World Bank and the FRELIMO

government. The Ministry of Agriculture and Rural Development (MADER) would focus on providing public goods and adequate regulation, while direct interventions in everything considered to be the sphere of the private sector such as pricing, input and output markets, subsidies and marketing would be phased out. In 1993, subsidies on fertiliser were abolished and prices for major food products such as maize meal, cooking oil and rice were liberalised. In 1996, remaining controls on wheat, bread, rents, fuel, utilities and transportation fares were removed, and in 1997, minimum producer prices for white maize, beans, groundnuts, sunflower, raw cashew nut, cotton, mafurra, paddy and tobacco were either pegged to world prices or transformed to indicative prices only. Veterinary services, credit and marketing and input supply were also eliminated, and free or significantly subsidised inputs were limited to cases of natural disasters (World Bank 2011).

It quickly became apparent that the reforms had been premature. Far from improving productivity, rapid privatisation and the liberalisation of markets for agricultural goods had removed established support structures with little thought as to what might happen should the promised assistance from the private sector fail to materialise. In the absence of a guaranteed buyer and without either the required expertise or infrastructure to get their products to market, small scale farmers reverted back to subsistence farming. Supply side problems were particularly severe, as former state run companies were unable to adapt quickly enough to the harsh demands of the marketplace. The state owned seed company *Sementes de Moçambique* (Semoc) for example, had been privatised in 1993, but lacking an extensive commercial network struggled to survive. Production plummeted to just over 5,000 tons in 1995 (well below the installed processing capacity of 18,000 tons/year), and in 1998 Semoc was sold off to a Zimbabwean company (Coulter 1996; Coughlin 2006). As a result, by the early 2000s, 48 of Mozambique's 128 administrative districts had no retail seed at all (World Bank 2005: 64).

In 1998, a five year National Agricultural Program (PROAGRI I) was set up by a group of donors and MADER in order to reform what were seen as governance shortcomings at the heart of the problem. Led by the World Bank, its aims were to coordinate the fragmented patchwork of agricultural programs and build institutional capacity in MADER at the national, provincial, and district levels. PROAGR I was also intended to be a way of better managing donor intervention in the sector by moving away from project based aid and towards more direct public sector assistance (Norfolk 2004). However, despite some successes, such as the introduction of a modernized public

accounting system, PROAGRI I was largely considered to be a failure. According to Daniel Sousa, the World Bank's project leader at the time, one of the main problems was the continued lack of capacity within MADER. Dspite their best intentions, donors were unable to create permanent institutional changes, and in many cases newly trained staff would leave for more lucrative jobs with other donors or within the private sector. There was also little to no leadership from the government which was preoccupied instead with large industrial projects and attracting foreign investment.

PROAGRI I was succeeded by a second phase, PROAGRI II, which ran from 2005 to 2009. It aimed to further build institutional capacity, increase food security, develop the commercial sector, increase the agricultural sector's contribution to the economy and sustainably manage forest and wildlife resources (Nhantumbo 2009). However, once again, it proved difficult to translate the strategic aims into operational successes and in 2006 the World Bank pulled out, complaining that the results had not been commensurate with the expenditure of resources. Today after two decades and billions of dollars of investment MADER is still notorious for its low level of human and physical resources, poor coordination and internally conflicting policy priorities. Around four to fiveper cent of Mozambique's total GDP is spent in the agricultural sector, yet according to Dr Rafael Uiane, a senior researcher at the International Food Policy Research Institute (IFPRI), most of the MADER budget is in the form of salaries and non-necessary equipment such as cars for mid-level to high level management.

At the district level, farmers continue to complain of low or fluctuating producer prices, a lack of modern inputs and high transport costs to market. Productivity is the lowest in southern Africa – of a total of 3.8 million farms, only 144,000 use fertiliser (four per cent), and 90,000 of these are in Tete, which is dominated by commercial tobacco farming (Census 2010). Only 266,000 (seven per cent) use improved seeds, most of them emergency gifts from NGOs. Savings and credit facilities are almost entirely absent – just three per cent of farms have access to credit and this nearly always comes from the concessionaire companies managing large cash crop schemes. Technical assistance is also sparse; only 14 per cent of the population have access to extension services, with an average of 1.3 extension workers per 10,000 rural inhabitants (Virtanen & Ehrenprais 2007). In 2010, around 1.6 million farms (42 per cent of the total) were forced to consume less than the normal amount of food at some point during the year.

An extensive survey of rural smallholders in 2006 concluded that, "frequently, farmers

associate these conditions to periods following the structural adjustment program, which they perceive them to have introduced risk to their agricultural activities as prices become unstable" (Mole 2006). Statistics from the latest agricultural surveys and census indicate that overall agricultural production in the last two decades has broadly kept pace with economic growth, averaging 6.4 per cent between 1996 to 2007 (World Bank 2011). However, researchers and policy analysts agree that most of these gains in production have come from increasing the area of land under cultivation, i.e. via agricultural extensification rather than intensification. In 1992, only five per cent of the country's 36.1 million ha of arable land was under cultivation; by 2001 this had increased to 11 per cent, and by 2010 it exceeded 15 per cent (Boyd, Pereira & Zaremba 2000; World Bank 2006).

The reason is that land availability is one of the few factors that is not a constraint for smallholders; the same study by Mole (2006) reveals that 55 per cent of typical farming households either start farming or increase their farm size by clearing virgin land. Since the majority of Mozambique's population lives in settlements that are either within or close by forests, this agricultural extensification has come largely at their expense. Land cover change as a result has been rapid – studies by Jansen et. al. (2008) and Temudo and Silva (2011) reveal how much of the previously virgin forest has been converted into either shifting cultivation with forests, or more permanent land under cultivation. Slash and burn is the dominant technique employed since it allows farmers to move onto new land very quickly and overcomes problems such as poor soil fertility and the lack of capital equipment such as chainsaws to clear the land.

## Poverty, energy and the charcoal trade

For rural Mozambicans, firewood collection and charcoal production offer an important source of income. Nhantumbo (2009) estimates that at least 50 to 60 per cent of the roughly 3.2 million families living in Mozambique's rural areas are engaged in activities related to this trade. Their degree of involvement ranges from seasonal activity in times of hardship to a significant proportion of a household's income that can exceed 75 per cent (Herd 2007). In some cases, it appears to be an obvious choice. Samiro Megane, a former FAO environmental consultant, outlines it quite clearly, "what would you choose? Three to four months of hard work on your plot, with the possibility of having your harvest ruined by drought or pests at the end anyway, or one week of work with instant results and cash in your pocket?" However, while charcoal offers an easy source of income producers still earn very little. A case study by Herd (2007) for example, showed that 95 per cent of producers in Sofala Province earn less than a dollar a day while another by Nhantumbo et. al. (2003) showed that the annual income for full time producers in central Mozambique only averages between US$150 to US$260, well below the official poverty line.

Accordingly, the charcoal trade is not a way for people in Mozambique to pull themselves out of poverty; rather, it acts as a quick way for the very poor to make money for essential products or as an activity of last resort in times of crisis (Wunder 2003). At the other end of the value chain are the retailers in urban areas. They are usually women, who make arrangements with the transporters to sell the charcoal and pay them afterwards. Like the producers they engage in retailing for subsistence needs and due to a lack of alternative employment opportunities. Many of them say they would have little alternative if the charcoal business was to be closed because of their age, educational level and lack of preparedness for formal jobs (Puna 2008). Their incomes vary between US$19 and US$54 a month, better than the producers, but not by much. As a general rule, the poorer the person, the greater their reliance on the production and sale of forest products such as firewood and charcoal for an overall share of their livelihoods.

On the surface, this should be good news for Mozambique's forest resources – since the end of the war Mozambique's economy has grown at an average rate of more than eight per cent, bringing almost three million people out of extreme poverty (AfDB 2011). According to proponents of ecological modernisation theory, growth should have created an income effect whereby people move away from both consuming and

producing fuelwood. The problem though, is that because Mozambique's economic growth has been primarily based on the post war expansion of agricultural production, one off mega projects and on donor assistance, it has not resulted in any real structural changes to the economy (see Castel-Branco & Ossemane 2009; Hanlon 2010; Cuangara & Hanlon 2010). Agriculture still accounts for 25 per cent of GDP and employs four out of every five people, while manufacturing, the next biggest sector, comprises only 12 per cent of GDP (and at least two thirds of this is accounted for by just one project – the Mozal aluminum smelter). Critics also argue that growth has not been very progressive. Boughton et. al. (2006), for example, have shown that 57 per cent of the total increase in consumption between 1996 and 2003 came from rich households and only eight per cent from poor households.

In rural areas, the contrast has been even more pronounced: 70 per cent of the growth in consumption came from the top quintile, and only three per cent from the poorest. Moreover, poverty levels for the country as a whole have stagnated at around 55 per cent since 2003 and in rural areas have regressed to 57 per cent (Census 2010). According to Cuangara & Hanlon (2010) this means there are now two distinct groups in Mozambique's rural areas. The first group, the top 40 per cent, earn more in cash than the value of what they produce for self consumption. A relatively minor proportion derive their income primarily from large scale commercial farming, formal employment or from their own businesses; the rest are small scale farmers who produce cash crops using chemical fertilisers and pesticides. Total family incomes range from US$1 to US$30 per day, of which half to two thirds is in cash. They also supplement their income through off farm wage labour, self employment and via remittances from family in cities and towns. This large off farm cash component means they are more productive farmers, even for their own consumption. These were the people that were pulled out of poverty between 1996 and 2003 and have subsequently seen a continued rise in income.

The second group, the bottom 60 per cent, survive on a total income of under US$1 per day for the entire family. What little cash they have comes from small sales of crops or charcoal or from day labour on neighbours' fields. They constitute what the authors call an 'invisible majority' caught in a poverty trap; too poor to participate in the market, and therefore incapable of using it to improve their situation (Canguara & Hanlon 2010: 10-12. See also Addison 2008). Because they operate using such small quantities, everything is more expensive. For example, selling maize by the *lata* (a large can used as a measure) earns less per kilogram than selling by the sack or lorry load. The same principle applies

to the buying or selling of fuel, transport, clothing and medicines. It also applies at the community level – when no one has money to buy it makes little sense to produce more to sell on the local market. For this group total income has declined significantly since 2002, and they are only marginally in the cash economy. It is these people who continue to rely on fuelwood in order to survive – and since 1992 their numbers have increased by over 30 per cent (Census 2010).

The other reason for the lack of an income effect is that most of Mozambique's population continues to rely primarily on wood for their energy needs. Only 13.2 per cent of households have access to electricity and in some provinces, such as Cabo Delgado and Zambezia, the figure is as low as two per cent. Even in the province of Maputo, coverage is only 24.5 per cent (Mulder & Tembe 2008). The problem is not a lack of power sources – the Cahora Bassa and Mphanda Nkuwa hydropower plants on the Zambezi River have a generating capacity of over 2,200 MW between them. Rather, it is distribution; due to the lack of power transmission lines and distribution networks installed capacity of the national power utility, Electricidade de Moçambique (EDM), is only 240 MW. By 2008 for example, more than 15 years after the end of the war, 50 of the 123 district capitals were still relying on diesel or gas generators (Chabal 2010).

While the EDM has had a sustained electrification program in place since the 1990s, the sheer logistics of its task are overwhelming. Mozambique is a massive country – over 800,000 $km^2$, and relatively sparsely populated. The majority of its citizens living in small towns and villages, often far from paved roads and urban centres. As Antonio Saide, Chairman of the National Directorate of Renewable Energies put it to me, “this is not a small little country like France!” Consumers are also often unable or unwilling to use alternative energies such as gas and electricity. The initial investment needed to acquire a gas stove for example, is at least US$25 while the other necessary equipment is estimated at around US$100, two times the minimum monthly wage (Puna 2008). Gas and electricity are also not available in small quantities – the minimum size for a bottle of gas is 1kg, which costs the same as a 60kg bag of charcoal. According to Osvaldo Manso, a consultant with the National Directorate for Lands and Forestry, the gas supply chain is also often interrupted, making it less reliable.

Thus, despite the greater overall cost it is easier for the urban poor to pay for a few bricks of charcoal at a time. In Maputo for example, someone can go to the local markets and buy themselves a meal by spending MZN5 for a tomato, MZN3 for a

handful of rice, MZN4 for a small fish, and MZN10 for three pieces of charcoal. This is about the average earnings of a beggar or a local car guard in a day. In many cases, there is a stated cultural preference – many Mozambicans prefer food cooked on charcoal over food cooked on gas or electricity stoves. Brouwer and Falcao (2004) for example, showed that in Maputo, many higher income households use a mix of fuelwood and electricity despite the latter being cheaper.

In a country where poverty is an absolute priority the issue of charcoal production is therefore primarily an issue of energy access rather than environmental degradation. As long as people continue cutting charcoal for their own usage and in order to supplement their income, government is unlikely to do anything about it. Alima Issufo, the head of the Forestry Department, admits that there is little they can do; as she points out, “you can't tell a hungry person to stop cutting for food and energy.” She suggests that a collective solution involving other ministries such as the Ministry of Energy is required, but that at the moment the political will does not exist. This has created gridlock; currently charcoal is too cheap to develop alternatives, but still too expensive for the poor. Accordingly until alternative energy sources become a reality, or until Mozambique attains sustained and lasting poverty reduction, charcoal production will continue as a major driver of deforestation.

## Forest governance and legislation

The rules and regulations governing access to Mozambique's forest resources are contained in the 1997 Land Act, the 1999 Forest and Wildlife Act and the 2002 Forest and Wildlife Regulation. Taken together, they constitute a landmark achievement for environmental law in southern Africa since they formalised, for the first time in Mozambican history, the rights of communities with regard to access, management, control and benefits from land and forest resources. The precedent was created by the 1997 Land Act, which recognised and protected traditional rights to habitation. A mechanism to allow communities to formally acquire these rights was created via what is known as the DUAT. This can be granted to those occupying land according to customary norms and practices or to those who occupy land in 'good faith' for at least ten years.

Crucially, the Land Act allowed for the recognition of DUATs without the need for formalisation and registration. The drafters recognized that local people had neither the know how nor resources to handle a registration process. They also knew that public land services were (and still are) unable to manage the workload of registering thousands of newly recognized customary land rights. Mandatory registration would simply cause most holders of customary DUATs to lose their newly legalised rights (Norfolk & Tanner 2007). Accordingly, the Act allowed communities to automatically hold a single state DUAT in their own name, with responsibility for the internal allocation and management of land rights taking place through their own customary systems. Lower order rights acquired by families and individuals in this way are equivalent to a state DUAT and do not need to be registered.

The third method of acquiring a DUAT is by request to the relevant state body. These are granted on a 50 year state leasehold, renewable for another 50 years. In order to avoid conflict those requesting new rights must carry out a consultation with local communities to ensure the land is free or to determine the conditions by which local rights are given up in favour of the newcomer. The Land Act also recognizes the right to private property but only to improvements and constructions made on or to land over which a private person or firm has a DUAT. These assets can be bought and sold, while the underlying DUAT is administratively transferred to the new asset owner. The overall aim was to ensure that communities would have access to land, but would still be able to negotiate agreements around land use rights with private investors. Under this

arrangement the role of the state is limited to ensuring that minimum standards are applied in these negotiations, that registration complies with technical standards and that the taxation system functions effectively (Norfolk 2004).

Many of the provisions of land use rights created by the Land Act were built upon by the subsequent Forests and Wildlife Act of 1999 and its Regulation of 2002. Communities were granted the legal right to freely access forest resources for subsistence needs not only in open access forests, but also production forests and protected areas such as national parks, reserves and cultural and historic sites. Two important instruments were included in order to try incentivise communities to participate in the co-management of those resources. The first, Article 102, stated that a part of the revenues generated through forestry and wildlife exploration should be allocated to communities living in the areas where resources are extracted. The actual share was later defined as 20 per cent by the 2002 Regulation.

The second instrument, Article 36, required those applying for concessions to enter into consultations with local communities before the license is granted. The consultation process was designed to encourage long term partnerships between local communities and private sector investors in rural areas and to reduce the potential for later conflict. According to Nhantumbo (2009) these various provisions were based on the recognition that it was inefficient to have the state serving so many functions in the sector; it was already in charge of policy formulation, implementation and law enforcement. The hope was that not only would the new legislation lift the burden of management from the state, but that it would make communities better off financially.

However, as Johnstone et. al. (2004) point out, there was a significant disparity between the Land Act and the Forests and Wildlife Act. While the former enabled the transfer of real rights to land, the latter maintained stronger *de jure* state ownership of forest resources, granting only subsistence level user rights to the community. This means that communities wishing to exploit forest resources for commercial gain are required to apply for a license, effectively putting them on the same playing field as the private sector. Originally, a Delegation of Powers had been drawn up to allow communities commercial rights without having to go through formal procedures; however, according to Duncan McQueen, a senior researcher at the IUCN who was involved in negotiations at the time, it was never passed because government wished to use land to generate money from outside investors.

The Forests and Wildlife Law also left a number of provisions open to further regulation. These included the delegation of power to management committees; mechanisms for revenue sharing from the 20 per cent community share and from fines for illegal activities, the content of management plans and appropriate levels of commercial taxes. As a result a number of further decrees and ministerial diplomas were developed and approved between 2000 and 2008. Some observers, such as Kir & Falcao (2004) and Bila & Salmi (2003) have complained that the failure to initially implement these further legal instruments created confusion and a negative atmosphere and led to a lack of motivation amongst many involved in the sector. Generally though, most observers agree that the principles of the legislation are strong and progressive, and that it has provided the land, wildlife and forest sectors with a firm base from which to work from.

The passage of the Forests and Wildlife Law also coincided with a broader overall push towards decentralisation of natural resource management by the Mozambican state. In 2000, traditional chiefs and headmen had been formally recognized as authorities within the government's administrative framework, and in 2003 the Law on the Organization of the Local State (LOLE) and its 2005 Regulation were passed, significantly strengthening the position of districts by giving them executive competencies and their own budgets. The LOLE also formalised the participation of local communities through the establishment of the District Consultative Councils, which brought together all relevant parties in decision making for local development. This created an important avenue for the channelling of local concerns into the district development planning and budget making processes (Brouwer 2008).

At the same time, efforts were being made to disseminate information on the new rights and entitlements of communities via the Land Campaign. In 2005, the Land Campaign became permanently institutionalised as the Land Forum, although donors continued financing several NGO groups to carry on the awareness raising process. This resulted in hundreds of information sessions with community groups, community leadership and local administrative structures (Norfolk 2004). Although there were some criticisms of the way in which consultation with community groups was carried out, the campaign was successful in reaching thousands of communities who would have otherwise had no source of information about land rights.

Knowledge dissemination also benefited from parallel efforts to establish CBNRM projects. The first CBNRM project in Mozambique, *Tchuma Tchato*, was initiated in 1994 in part of the Zambezi Valley in Tete Province. It was based on the experiences of CBNRM in Zimbabwe which emphasized that conservation must extend beyond protected areas into the wider landscape, requiring a compromise between the needs of wildlife and those of local communities (Virtanen 2005). In 1997 the focus shifted from wildlife to forest management, with pilot projects established in Maputo, Manica and Nampula provinces as part of PROAGRI I and with financial support from the FAO, the Dutch government, the Ford Foundation and the IUCN. Over the years many NGOs have also supported CBNRM in Mozambique. In 1998 there were 32 projects, in 2001 there were 42 and by 2011, more than 70 existed.

According to Nhantumbo et. al. (2006) these experiments in CBNRM have been instrumental in developing best practices on areas such as community leadership structures and democratic processes at the local level. They have also facilitated community land delimitation and created management plans and small enterprise development groups. In the process they have helped introduce the concepts of community management to various stakeholders and created important platforms for dialogue. Most importantly, they have produced measurable benefits in terms of the growth of number of species, biodiversity conservation and the harvesting of wood for firewood. This is attested to in comprehensive documentation by Nhantumbo et. al (2006); Sitoe at al (2007) and (Nhantumbo 2009). Communities have also started to receive direct tangible benefits from the commercial exploitation of forest and wildlife resources. The system has only effectively been operating since 2005, and already there have been reports of communities using the revenues to invest in social infrastructure such as roads, boreholes, schools and clinics, invest in community law enforcement, or provide small business infrastructure such as grain mills. Others have been able to extract significant concessions in cash or social investments from operators as a result of consultation requirements (*ibid*).

However, there are now concerns that these successes will not prove sustainable. According to proceedings from a recent CBNRM conference, five years is the minimum investment period before enterprises are able to generate positive net benefits (MINAG 2011). The problem is that in many cases, facilitators (i.e. donors) have left before the projects have become self sustaining. Reports have also shown that some of the consultation processes between communities and the private sector as mandated by both

the Lands Act and the Forests and Wildlife Act have experienced problems (Norfolk 2002). Local administrative structures provide no support or guidance, and local elites often manipulate the consultation process for their own benefit. Structural problems exist, such as the inclusion of a mandatory financial 'incentive' for the community group and the lack of a system for capturing the terms of agreements and monitoring compliance. And, although there is now a high awareness on the part of communities of the requirement that they be consulted in applications for private land use rights, they often complain that there are other 'local structures' that are consulted in their name and that the quality of consultations has been unsatisfactory.

There have also been complaints about the slow pace at which communities have received their share of the 20 per cent of revenues from forest extraction activities. An implementing mechanism for the distribution of these revenues was only approved in 2005, more than three years after the proportion had been decided by the 2002 Regulation. It required that communities be represented by a natural resource management committee and that the committee must have a bank account. Although this seems a minor requirement, most rural communities need assistance in establishing a committee and training it in basic legal and management issues. In addition few districts are served by financial institutions and very few rural residents have identity cards (Sitoe & Ttichque 2006). These factors have made take up slow – by 2009, more than 1100 communities had been identified as eligible, yet only 542 had received funds totalling US$1.9 million (about US$3,500 per community) (DNTF 2009). The risk therefore is that the enthusiasm and hope generated by the prospect of improved livelihoods is changing into frustration as CBNRM in forested areas is seen to meet only one objective – environmental sustainability – and not the improved income that people have been promised (Nhantumbo & Izidine 2009).

## Institutional arrangements

During the colonial and post independence era, Mozambique's forests and wildlife services were generally well regarded. Foreign consultants were often brought in for collaboration and assistance and there was a considerable effort to recruit and train the next generation of field agents. Between 1977 and 1981 for example, approximately 28 Mozambicans, with the equivalent of 6th grade level education underwent an intensive one year course in parks administration, wildlife management and selected academic courses at the newly created Gorongosa Wildlife Training School. A parallel course was run for forestry staff, while in service training was provided to existing medium level Mozambican staff (Hatton et. al. 2001). Unfortunately the civil war brought most of these efforts to a halt. Protected areas and reserves were abandoned to the rebels, communities were forced to flee and almost all forms of government controls were stopped due an inability to patrol. After three rangers were killed on duty most wardens and rangers were relocated to headquarters in Maputo or in the provincial capitals.

Following the Peace Accord in 1992 responsibility for all policy, legislative and regulatory functions related to the forest sector fell to the Forestry and Wildlife Services (DNFFB), part of what was then known as the Ministry of Agriculture and Rural Development (MADER). Milagre Navunga, who was the head of the DNFFB between 1992 and 1995 recounts how, in the early years, much of their focus was simply on tracking down missing colleagues and investigating what infrastructure had survived. A major problem was landmines, and they would often have to ask former FRELIMO soldiers to guide them into former forest reserves. In a few instances, where the risk was too great, they would have to fly in by helicopter. Some offices were completely derelict, with trees growing out of the windows and wildlife sheltering inside. In other areas they would find piles, two to three stories high, of animal skeletons left behind by the roving army butcheries.

Meanwhile, at the DNFFB headquarters there was concerted attempt to try to develop a coherent set of policies for forest governance and legislation to accompany them (Norfolk 2004). This began in 1991 with the drawing up of a provisional programme under a UNDP/FAO team. It was followed in 1993 by a Forestry Pre-Programme for a period of 18 months with finance provided from the UNDP. In 1995, a National Programme of Forestry and Wildlife was prepared, and in 1996 an Investment Programme for the Forest and Wildlife Sector, was drawn up with technical assistance

from the FAO/UNDP. In 1997 a substantive policy finally appeared when the Forestry and Wildlife Policy and Strategy was adopted by the Council of Ministers. In the same year the Land Act was passed, followed in 1999 by the Forestry and Wildlife Law and its Regulation in 2002, representing a major triumph for forestry policy in Mozambique.

In 2001 however, the forest sector underwent a series of institutional changes. A Presidential Decree transferred 'wildlife in protected areas' (i.e. in parks, national reserves, hunting areas and areas of community development) to the Ministry of Tourism (MITUR), leaving behind 'wildlife outside protected areas' under the administration of the DNFFB. And in 2005 MADER itself was restructured, losing Rural Development to become simply the Ministry of Agriculture (MINAG). Under the new arrangement the DNFFB was combined with the Lands Directorate to become the National Directorate of Lands and Forestry (DNTF). By combining forests (which cover more than 50 per cent of the country's surface) together with lands (encompassing all continental mass) the DNTF became the key institution in addressing issues of equitable access to resources, benefit sharing and sustainable resource management in Mozambique (Nhantumbo 2009).

However the new arrangement was a poor deal for the forest sector. When forests and wildlife were still housed in the same department, both received a similar level of attention. Now, since land is politically more important than forests, it tends to be prioritised. As Alima Issufo (Head of the DNTF) remarks, "it still feels like we're on trial." Forests are not high on MINAG's list of priorities either; forestry is the only sub-sector of agriculture for which the minister has no assistant, and is regularly ignored in favour of other initiatives. One of the major stated aims of the agricultural sector in recent years for example, has been the improvement of food security. As Nhantumbo and Izidine (2009: 11) point out though, "in a low input agriculture based economy such as that of Mozambique, agricultural production increase results from area expansion, often accompanied by unsustainable practices such as slash and burn. Therefore, while food security may improve, the forest cover and the carbon sink potential may be reduced – particularly if the crops grown are annual rather than perennial."

Forests have also received the short end of the stick when it comes to the allocation of ministerial funds. Under the current arrangements most of of the DNTF's revenues (54 per cent) go towards the centrally administered Agricultural Development Fund (FDA), with the rest going to communities (20 per cent), the Ministry of Finance (20 per cent)

and the SPFFB (6 per cent). Fines are distributed between the FDA (50 per cent) and the SPFFB (50 per cent). Forestry accounts for the bulk of the FDA's disbursement and in recent years its overall contribution has increased noticeably thanks to a readjustment of timber royalties and increased international demand for precious species. Yet, as Table 4 shows, only a small proportion of those revenues are regularly returned to the DNTF for activities like reforestation and law enforcement. This arrangement appears even more perverse when one considers that many of the agricultural activities funded by the FDA contribute to the problems experienced by the forest sector in the first place. However it appears unlikely that the arrangement will change; according to Carla Cuambe (UN-FAO) the DNTF received a stern rebuke from the Minister of Agriculture when it proposed getting some of its revenues back at an internal meeting in 2010.

| Year | Total forest sector revenues (millions US$) | Forest sector revenues allocated to FDA (millions US$) | FDA expenditure (millions US$) | FDA allocated to the forest sector (millions US$) |
|---|---|---|---|---|
| 2002 | 0.66 | - | 1.06 | - |
| 2003 | 2.23 | 1.5 | 1.48 | 0.18 (8%) |
| 2004 | 2.43 | 1.79 | 2.2 | - |
| 2005 | 4.96 | 3.26 | 3.23 | 0.43 (13%) |
| 2006 | 5.9 | 3.36 | 7.24 | 1.40 (41%) |
| 2007 | 6.16 | 3 | 9.39 | 1.50 (50%) |
| 2008 | 4.36 | 4.3 | - | 0.40 (9%) |

Table 4: Mozambique forest sector revenues and financing.
Sources: Kir & Falcao (2004); Nhantumbo (2009) and World Bank (2011).

Of course, not all funding comes from the government. In the last decade, bilateral and multilateral donors including Norway, Italy, Germany, the FAO, SADC, the EU and the World Bank have made millions of dollars available to the forest sector via a series of programs. These ranged from support for community forestry to forest inventories and law enforcement programs, to the implementation of legislation and the provision of credit to forest industries. However this money has often been targeted at specific interventions and the bulk has been controlled by the donor institutions themselves. Accordingly, it has not provided financial independence to the DNTF. Moreover much

of it has not been spent; between 2007 and 2009, of the US$171 million made available from external sources US$42 million was not used (Nhantumbo 2009). The DNTF suffers therefore not only from a lack of funding but also a limited capacity to absorb and spend it when does become available.

## Law enforcement and departmental capacity

One of the main concerns of the environmental community in Mozambique is that while the legislation governing forests and wildlife is progressive, the government has failed in implementing and enforcing the laws. Responsibility for this is the duty of the Provincial Services of Forestry and Wildlife (SPFFB) which carries out this function through an inspection service (*fiscalizaçao*) in the field. It has however, experienced significant problems since the end of the war, when its inspectors first began encountering newly returning refugees moving into previously innaccessible areas. Because the resettlement process was regarded as a social issue little thought was given to the potential impact on forest resources. Moroever the issue of forest law enforcement at the time was a political non-starter; as Milagre Navunga (former head of DNFFB) recounts, the unnofficial government positition was that, "after fifteen years of suffering, the last thing we should do to our newly returned refugees is make any of their activities illegal."

The SPFFB were also woefully understaffed. According to Ana-Paula Reis, head of the SPFFB in Manica between 1991 and 1997, there were only 15 to 20 *fiscaix* available for the entire province, and around 300 for the country as a whole. They had no uniforms, and were badly paid – she received an annual salary of MZN8,000 a year, and the law enforcement officers between MZN1,000 and MZN2,000. An internal SPFFB report at the time also revealed that staff were unmotivated and demoralised due the low level of support, the lack of equipment and transport, concern about corruption, lack of leadership at the provincial level and a lack of contact with the DNFFB headquarters (DNFFB 1994). Their job was made even harder by the lack of effective enforcement by traditional authorities who were either absent or still re-establishing their authority over subsistence activities (Costa et. al. 1993). During the colonial era for example, traditional chiefs had overseen strict laws regarding the cutting of trees and the setting of fires. When civil war broke out though, the traditional system broke down. By the time people returned to their lands, many were not old enough to remember those laws, and proceeded to clear and burn unsupervised.

The approval of the Forests and Wildlife Law and its Regulation in 2002 was supposed to improve the situation. Article 112 of the Regulation established that 50 per cent of the fines collected from illegal activities should be given to forest patrol agents and community members who participate in law enforcement activities or report infringements. Initially this had a noticeable effect – the application of non-compliance

penalties and sales of confiscated wood increased from US$17,700 in 1999 to US$172,000 in 2003 (World Bank 2005). The Regulation also established a rate of 20 per cent of the base salary of an inspector and assistant inspector as an additional benefit as compensation for the risk involved in their work. However while the implementation of the salary supplement was straightforward the distribution of fines was more difficult to implement, since it suffered from the same problem as other forest revenues which reverted to the budget of MINAG. By 2009, of the total value of fines issued by the SPFFBs, only around one quarter had been paid. In addition there was no provision made for the desegregation between state enforcement and cases in which the community has been the reporter (or informant) of the infractions. As a result, the incentives have not always worked as well as intended.

Moreover thanks to the aforementioned institutional arrangements and a continued lack of funding there has been little improvement in overall capacity. By 2004 there were only 435 active forestry and wildlife inspectors attached to the SPFFB, and following the 2005 restructuring many of these were allocated to parks and reserves under MITUR. In 2009, the entire DNTF consisted of 86 office staff, and there were only 345 forestry law enforcement officers in the SPFFB (Nhantumbo 2009). There is also lack of DNTF technical assistance to the provinces in forest management, industry, inventories, zoning and wildfires, and a noticeable lack of data collection and systematisation. The majority of inspectors (around 85 per cent) are either elementary level or basic level technicians with little or no vocational training and, despite the salary boost in 2002, are still poorly paid. A number of district offices lack any form of communication equipment such a radio, and armed patrols are often impossible due to a lack of weapons. Most provinces have only one or two cars and a handful of motorcycles available. Most of these are old and experience frequent breakdowns.

The overall lack of coordination and harmonisation at all administrative levels has resulted in some noticeable gaps in the way in which certain laws are interpreted. An example is given by Dr Teresa Alves, a forester at the Institute for Agricultural Research (IIAM), who points out that while community users are allowed to use forest resources for subsistence use, in order to do so they have to clear cut. However as soon as they have clear cut they are not allowed to sell the timber for commercial use. This makes little sense – once the area is cleared the wood might as well be put towards productive uses. For example, why not let it be used by those who have applied for charcoal licenses? Another loophole pointed out by Sitoe and Ttchique (2006) is that it is possible

to transport reasonable quantities of forest products for subsistence use without transit tickets. This situation has led to commercial operators' use of bicycle riding transporters, who carry two to four bags of charcoal as though for subsistence, thereby avoiding payment of licence fees. Officials in the town of Beira for example, have reported cyclists transporting as many as 400 bags of charcoal a day in total, clearly for commercial purposes.

An interview with Maria Augusta, head of the SPFFB in Sofala, reveals how many of these challenges work in practice. Her headquarters are based in Beira, where there are 17 employees in three departments – forests, wildlife outside protected areas, and enforcement. She is also in charge of the six employees for each of the five fixed road posts in the province, and one or two *fiscaix* in each of the 12 districts. According to her the resources are woefully inadequate – she would need five *fiscaix* per district and at least another ten fixed road posts in order to carry out proper enforcement. There are only two cars in the entire province, both of which are not working because of engine damage.

Her biggest problem is the illegal trade in charcoal which is used to supply both Beira and the more distant Maputo. She says it is a simple matter of economics – a bag of charcoal in Sofala costs MZN100 yet retails in Maputo for MZN400, creating a thriving trade. Licenses for charcoal cost MZN11 per bag however, these are only enforced at road posts, and therefore almost impossible to regulate. In the agricultural sector the biggest problem is the lack of accurate information on land usage; without it her *fiscaix* are unable to enforce zoning laws. This creates major problems with human-wildlife conflicts and results in widespread illegal agricultural activities in the forest reserves. Fire is also a major problem since the first thing local users do when they acquire a new piece of land is to set it alight in order to clear the grasses and begin farming. In the dry season, this results in uncontrolled and widespread forest fires.

The reality of daily enforcement duties is explained by Nhagumbo Diuis Ant'onio, the *fiscal* for Cheringoma, a district about 100km from Beira. His salary is MZN5,433 (US$185) per month, a little higher than average since he has a high school education and has been working there since 2008. He receives a petrol allowance of seven litres a day which gives him a range of 70km; however he says he would need to do about 120 km a day to conduct the job properly. Since most charcoal production in the area is for domestic usage his main job is the supervision of the two game farms and eight

commercial concessions in the area. While he seldom needs to visit the game farms he says the concessions are consistently in breach of the law governing resource extraction and that he regularly issues them with fines. When I visited, there were two impounded lorries and some confiscated wood next to the office – one lot of 23,494 $m^3$ with a MZN41,748 fine, one of 17,324$m^3$ with a MZN38,513 fine, and a third lot of 13,390$m^3$ with a MZN36,600 fine. Once the operators pay they are allowed to go free; however, the wood remains and is auctioned off. In practice the operators will often buy the same wood again at the auction since its value is still higher once sold off.

## Commercial forestry and illegal logging

One area in which the DNTF and SPFFB's lack of capacity has been keenly felt is commercial forestry and in particular, the problem of illegal logging. Although not a direct cause of deforestation when conducted in an unsustainable or uncontrolled fashion, this can result in forest degradation, and contributes indirectly to deforestation by opening up new areas of primary forest to other users. In some cases, illegal logging has also reduced monitoring interest – once all the valuable timber in area has disappeared officials have had less of an incentive to look after the forests there. The surrounding area of Beira for example, was heavily logged after the war and has now been abandoned to charcoal and agriculture. Many of these difficulties have been related to the lack of enforcement, others are related to the way in which the commercial sector has been administered and legislated for by the government. That said, the story of commercial forestry in Mozambique in the last two decades is not uniformly negative. There have also been some notable successes such as the implementation of higher taxes on the exports of precious species and the growing salience of the issue within higher government circles.

During the colonial and post colonial period and for the first decade after the war, the management of Mozambique's forest resources was the exclusive responsibility of the state. With a few exceptions commercial logging was conducted based on simple timber extraction plans that were drawn up without any consideration to sustainability. The industry was dominated by traders of South African origin, who worked via a system of forward finance by providing chainsaws and capital to Mozambican logging operators in exchange for timber. While operating fees existed they were not enforced in practice. In 2001 though, following the passage of the Forests and Wildlife Act, government introduced long term concessions to private operators on the proviso that they included approved management plans. These were required to have the names of tree species to be subject for exploration, the planned annual allowable cut for the first five years, any industrial or construction plans, mechanisms for law enforcement and monitoring and benefit sharing arrangements for local communities.

An annual simple license was also introduced. Exploration under this regime was granted exclusively to Mozambican operators and local communities and limited to pre-defined tree species, in a given area, and for a quantity not exceeding 500 $m^3$. The stated goal of the DNTF was to phase out the annual license in favour of longer term

concessions over time; hence all applicants were requested to submit a basic forest management plan as well. The legislation came into effect in 2002 and subsequent demand for both forms of license has been high. The total number of long term concessions granted by the end of 2008 was 156, covering an area of 6.2 million ha, and between 400 to 600 annual licenses are granted every year (Nhantumbo & Izidine 2009). However compliance with their associated regulations has been difficult to enforce. There are not enough qualified personnel to conduct the kind of monitoring required and many of the administrative districts do not have copies of the forest licenses or up to date lists of areas on which to base the negotiation of licences.

In practical terms this had made it almost impossible for the *fiscaix* and district authorities to monitor licensed volumes, and control often ends up being conducted based on what forest operators state verbally. (Ribeiro 2009). Many concessionaires, secure in the knowledge that they are unlikely to be monitored, have thus designed their management plans merely to ensure that the concession will be acquired rather than as an accurate indication of planned field level activities. Once approved the plan is effectively ignored. Others do not even bother; of the 167 concessions approved by 2009, 76 had no management plan at all. Similarly annual license holders have made no attempt to prepare even the most basic plans. They sell their timber to transport middlemen and agents, and because enforcement is weak they are often able to exceed their annual allowable cut.

As Table 5 on the following page shows, the licenses have not been phased out either; despite pledges from the DNTF, the total number of operators actually increased from 448 in 2002 to 616 in 2008. A decade after the introduction of the legislation, the volume harvested by annual license holders still accounts for double that of the long term concessionaires. As Nhantumbo (2009) states, until adequate regulation and technical support becomes available existing annual operators are unlikely to either become concessionaires or leave the sector since the licenses are still an important source of employment and income. Alima Issufo (Head of the DNTF) admits as much, saying that policies and strategies are no longer enough and that a reduction in the numbers of annual licenses will now require a legal instrument.

| Year | Concessions approved | Concessions with management plans | Annual licenses |
|---|---|---|---|
| 2001 | 32 | 1 | |
| 2002 | 20 | 0 | 448 |
| 2003 | 29 | 5 | 434 |
| 2004 | 13 | 8 | 495 |
| 2005 | 6 | 26 | 462 |
| 2006 | 26 | 20 | 630 |
| 2007 | 10 | 8 | 637 |
| 2008 | 19 | 12 | 616 |
| 2009 | 12 | 11 | 479 |
| **TOTAL** | **150** | **91** | **4201** |

**Table 5:** Evolution of the Mozambique's two commercial harvesting regimes.
Sources: DNTF (2009) and Nhantumbo (2009)

In 2003 higher timber fees were introduced. The aim was to curb spiralling profits among forest industries and redress the low government revenues from the sector (FGLG 2008). Forest tree species were placed into five different classes, and tax rates were calculated to allow reasonable but not excessive profits for the industry – although the amounts were still marginal compared to comparable tax rates in other countries (Rytkonen 2002). A ban on the exports of first class round timber species was also imposed, with the aim of encouraging local processing. However the move caused a furore amongst operators, local governments and politicians, based on the fear that the sector would be forced to cut production and that illegal cutting would dominate. According to Duncan Macqueen (IIED) there was also considerable opposition from former military interests in many of the provinces, something which created a lot of fear amongst those attempting to get the laws passed.

A wave of lobbying via provincial governors to Ministers followed, and at the National Forestry Forum in 2003/2004, at least four pieces of proposed legislation were voted

down. A resulting ministerial diploma cut rates by 50 per cent and a 40 per cent fee reduction was also granted for all logs processed domestically, rising to 75 per cent for the three most popular species, *umbila*, *chanfuta*, (*Pterocarpus angolensis*) and *jambirre* (*Millettia stuhlmannii*). In 2004 these three species were upgraded to precious class in order to get around the ban on first class exports. These changes can be seen in in Table 6, below. The problem with the new measures is that as Kir & Falcao (2004) point out, they have effectively acted as subsidies to compensate for the technical and economic inefficiency of most forestry operators. On the other hand revenues in the forest sector have greatly increased. Following the initial fee revision, revenues increased almost five fold from MZN12 million (US$0.5 million) in 2002 to MZN54 million (US$2.26 million) in 2003. By 2007 total sector revenues were MZN185 million, of which around 85 per cent was made up of license fees. However as previously described, a large proportion of these revenues has been directed towards funding non-forestry related activities by MINAG.

| Wood Class | Old license fees, pre-2003 (1000s MZN) | New license fees, post-2003 (US$) |
|---|---|---|
| Precious | 105,000 | 8.5 |
| 1st class | 65,000 | 5.2 |
| 2nd class | 45,000 | 3.6 |
| 3rd class | 30,000 | 2.4 |
| 4th class | 20,000 | 1.6 |
| Charcoal | 2,500 | 0.3 |
| Others | 25000 | 2 |

**Table 6:** Commercial timber license fees in Mozambique
Source: World Bank (2005)

To make matters worse, illegal logging by overseas operators has increased substantially in recent years. This logging pressure is felt mainly on the most valuable commercial species which due to the low density nature and openness of Mozambican forests, are much easier to find, access and remove. In 2002 clandestine timber production was estimated to account for between 50 and 70 per cent of the total national production and the extraction of valuable trees at between two and four times its sustainable potential

(Reyes 2003). Since then the situation has deteriorated, as documented in a seminal report by Mackenzie (2006) on illegal logging in the province of Zambezia. Her research showed how Chinese logging companies entered the market aggressively in the early 2000s, and have quickly managed to out compete other traders with better timber purchase prices. They have continued the forward financing system established by South African companies in the 1990s, providing trucks and chainsaws (mainly second hand and imported from China) and have acted as middlemen and transporters for annual license holders. Operators bribe officials at roadblocks and ports, and export the unprocessed logs to China.

A follow up report by Mackenzie (2009) and a more in depth one by Kannounikof & Falcao (2011) have found a similar situation in the province of Cabo Delgado. According to these reports, there have been two major drivers for the *recorrida para o mato* (rush to the bush). The first is the failure to monitor the transportation of timber and other forestry resources between different administrative regions, as well as on the way to the ports and other points of export. When an annual logging licence is issued the operator is provided with transit tickets to be used during transportation of the forest products. Tickets are presented to forest guards positioned at fixed checkpoints along main roads only. A copy of each transit ticket is sent to the DNFFB for monitoring of the quantities exploited. The problem, as Graeme White, the owner of a forestry company in Sofala, points out, is that while these checkpoints can check if timber has been illegally logged they cannot check whether its been irresponsibly logged. The checkpoints are only manned during daytime and the guards are poorly paid, earning only around US$100 a month. When an operator with a load of logs worth more than US$10,000 arrives without papers it is not difficult to imagine how illegal activities might take place. Even where the contents of a truck are confiscated the problem is often easily solved with a phone call to a minister or provincial officer.

The second driver is the continued high demand for Mozambique's forest resources from overseas. Chinese operators dominate the market because, in addition to high domestic demand its officials impose very low taxes on raw logs, and much higher ones on processed woods. On the Mozambican side increasing numbers of people have been encouraged to change jobs to start becoming simple license holders and sell timber to the traders whose “demand doesn’t stop” (Kannounikof & Falcao 2011: 9). Other observers have described the operating environment as being akin to ‘gold fever’ where everyone rushes madly to maximize their profits on the exploitation of a finite resource. Community members

participate in the frenzy by obtaining simple licenses often with the backing of foreign nationals, or by logging without a license and selling the trees to license holders (Reyes 2003). As a one report concludes, “too many operators, large and small, are being allowed to take too many logs from too many places, degrading forest resources, often as much in traditional community areas as outside them,” (McQueen 2008: 2).

Figure 17: Isolated patch of miombo on the road between Beira and Dondo, Sofala Province, Mozambique. *Picture by author*

# 7

# Why Governance Matters

*"It's really amazing. You plant a seed; it germinates and looking so fragile, and within a very short time it becomes a huge tree. It gives you shade and if it's a fruit tree it gives you fruit… to build and transform lives… We want to see many Africans planting trees.*

*…*

*"It is a bit sad that we have a government in this country that is actually overseeing the destruction of the forests. There comes a time when humanity is called upon to shift to a new level of consciousness. You raise your consciousness to a level where you feel that you must do the right thing. We see governments mistreating their citizens to the fullest... who is going to question when the law keeper breaks the law?"*

Wangari Maathai (2007)

This thesis is an investigation into the structural causes of deforestation in the miombo woodlands of southern Africa. In the opening chapter, I suggested that this is an important topic for social science research since the miombo woodlands are one of southern Africa's least appreciated environmental resources. They are responsible for maintaining the livelihoods of millions of the region's poorest people, and offer invaluable services as stores of biodiversity and carbon and as habitats and watersheds. Despite this, they are disappearing rapidly. Until now the problem has been relatively ignored by policymakers and researchers, who have tended to focus primarily on forests with high potential for carbon storage. I identified the central research question for the thesis as follows: what were the structural causes of deforestation in the miombo woodlands of Zambia and Mozambique between 1990 and 2010? In answering that question, my goal was to explain why Zambia experienced relatively higher levels of deforestation during this period than Mozambique. I also hoped to develop a better

understanding of why deforestation occurs not only in these countries, but also the miombo eco-region as a whole. I then introduced my argument, which was that different rates of deforestation in the miombo woodlands can be attributed to country specific forms of policymaking and institutional design. This was the basis of what I call the *governance based explanation* for deforestation, which contradicts conventional, *resource based explanations*.

In the second chapter I laid out an analytical framework for developing that argument more fully. I began by emphasising the difference between proximate causes of deforestation (socio-economic activities that impact on forests) and structural causes of deforestation (the fundamental forces that underpin those activities). Having made this distinction clear, I went on to outline some conceptual guidelines for how to think about structural causes of deforestation, categorising them under the labels of demographic, economic and governance related factors. I showed how the impact of these factors is often not intuitively obvious, and how they interact with each other in complex ways to create different outcomes for forests. I also showed why, of the three, I considered governance to to be the most important structural cause of deforestation, because it either mitigates or exacerbates the impact of demographic and economic related factors.

In the methological section of the thesis, I argued that a comparative, case study based approach offered the best way of approaching my research question. This is because it offers a 'third way' between quantitative macro-scale approaches, which are good at locating causal mechanisms but weak on external validity and specifying causal effects, and more limited but qualitatively richer single case study based approaches (Gerring 2007). I then justified my choice of Zambia and Mozambique as the two country case studies, showing how their respective geographical and socio-economic conditions were at the same time 'similar and incomparable' enough to be able to derive some useful insights from a side by side comparison. I also described my research methods, showing how I obtained my data, what kinds of questions I wanted to ask and how I went about obtaining answers to those questions.

In the fourth chapter I turned towards the findings of the research itself, beginning with data on the independent variable – rates of deforestation. Using the best available studies, I established that Mozambique's annual rate of deforestation during the last twenty years has been much lower than Zambia's. This was a crucial part of the research, since the difference in their respective rates of deforestation underpins much of the

comparative logic applied in the thesis. I then described and analysed the proximate causes of forest loss in each country. I showed how these were very similar in both cases, and could be attributed to a 'vicious cycle' of shifting cultivation, charcoal production and uncontrolled burning. This part of the analysis was important for two reasons. Firstly, it showed that the difference beteen Zambia and Mozambique's rates of deforestation could not be attributed to the existence of different proximate causes. This lent greater strength to my argument that the difference must be accounted for by the impact of respective structural causes. Secondly, it provided an important preliminary step in trying to understand the links between proximate causes and structural causes of deforestation in each country. It would have made little sense for example, to later suggest that rural migration was a structural cause of deforestation if I had not been able to first show that shifting cultivation and charcoal production were leading causes of forest loss in rural areas.

In the final two chapters, I delivered a historical and analytical account of the different structural causes of deforestation in Zambia and Mozambique respectively. The two case studies offer valuable new insights into the processes underpinning deforestation in each country, and contribute to the existing literature on causes of deforestation in developing countries. However, on their own they offer only partial clues as to the structural causes of deforestation in the miombo woodlands more generally, since they do not map their findings to other cases. Accordingly, in this chapter I compare and contrast the findings of the two case studies, with the aim of inferring the existence or absence of causality through correlation between the dependent variable (rate of deforestation) and the independent variables (different demographic, economic and governance related factors). In this way, I aim to move the analysis along the spectrum from statements of possibility towards a statement of probability, and thereby obtain some clear answers to the original research question. This offers an opportunity to deliver convincing policy relevant and contingent prescriptions of which strategies are likely to work best in order to limit deforestation in the miombo eco-region more generally.

## A resource based explanation for deforestation

In February 2011, I spent an afternoon in the company of Robert Chimambo, a well known environmental activist from Lusaka. Under the shade of the mopane tree in his backyard, he recounted the story of the encroachment, deterioration and eventual disappearance of the Lusaka East Forest Reserve. The reserve was originally set up to protect the source of the Chalimbana River and is the only public protected area and large natural green space in the immediate proximity of Zambia's capital city. According to my host, several years ago the reserve had been in such good health that scientists from local research institutes had used it to conduct investigations into miombo forest ecology. Since then however, people from outlying rural areas had arrived looking for work, and unable to find space in any of the existing townships on the city outskirts, had created informal settlements inside the reserve.

Lacking jobs or any alternative source of income, they began clearing the forest for small agricultural plots, and chopped down the trees to use for firewood and charcoal. In spite of numerous protests and petitions by local NGOs, the ZFD did nothing to stop the new settlers, stating that it had neither the manpower nor the mandate to do so. According to my host however, the real reason was that local politicians with powerful connections to the ruling party had warned the ZFD off, since the settlers represented new constituents and therefore new votes. Mr Chimambo then showed me recent pictures of the reserve, showing large areas of cleared forest now taken up by shacks and small vegetable plots, with a few scattered thickets of trees and evidence of heavy soil erosion. There was also evidence that developers had started clearing land for more permanent buildings. It seemed impossible that the same place had been a pristine forest just a few years previously.

At the time, the story appeared to be a perfect example of the larger forces driving deforestation in Zambia. It contained a number of easily identifiable structural causes – population growth and urbanisation, poverty and unemployment – and was given force by its denunciation of the officials whose job it was to look after the forest. The next day however, I interviewed a mid-level employee in the ZFD and was surprised to hear him deliver an identical analysis, except this time, as an explanation for deforestation in the country as a whole. He told me how almost all of Zambia's forest reserves were currently suffering from encroachment, and how poor communities, lacking alternative sources of income, had been cutting down forests for land and wood at a faster and more

unsustainable rate every year. Politicians, he suggested, were unwilling to do anything about the problem since it would be seen as a direct act of interference in the ability of the country's poorest people to earn a living. This would equate to certain political suicide in a country like Zambia.

What struck me as unusual was that while the activist and the official disagreed about what measures should be taken to tackle the problem, to an uncanny extent, they both agreed on its proximate causes (charcoal, agriculture) and structural causes (population growth, poverty and a lack of political will). In the days and weeks that followed, I encountered variations of this explanation in the majority of interviews I conducted. When asked the question "what have been the structural causes of deforestation in the last two decades?" most respondents almost always singled out the same factors. They claimed the economic reforms of the 1990s placed forests under increased pressure thanks to the fallout from privatisation, and changed the system from one that managed resources to one that was no longer able to do much of anything. This has been made worse by continued population growth, especially in the urban and peri-urban parts of the country, where demand for charcoal has been steadily increasing thanks to the lack of reliable and cheap electricity. Many respondents also pointed out that forests are not a priority sector, and that politicians and officials are more interested in their exploitation than their conservation. This, they told me, is why the forest sector has remained under funded, under staffed and unable to carry out its job for so many years.

Those same politicians and officials responded by saying that in a country like Zambia, the responsibility of those in power is to lift people out of poverty and create jobs, and not to waste scarce resources on less important (and usually, Western) concerns such as forests. All however, agreed that at its core, the problem was an economic one. Zambia they explained, is a poor country, and poor people consume those resources (such as forests) that are most easily accessible to them. This, they suggested, is where the true problem lies, and until it is solved, deforestation will continue to be a problem. This narrative, which I subsequently came to call the 'resource based explanation', is encapsulated by a recent submission by Zambia to the United Nations as part of its REDD+ preparation strategy, in which the structural causes of deforestation are said to be "a result of the intrinsic nature of the Zambian economy, based on i) the overwhelming reliance of the largely poor rural population on natural resources for day to day survival; and ii) the lack of alternative energy sources in urban areas where much of the population also utilise charcoal and firewood for fuel" (UN-REDD, 2010: 9).

The resource based explanation for deforestation concentrates on the impact of both demographic and economic related factors, and is so called because it revolves around the issues of allocating scarce resources. In particular, it is based on the idea that a growing population of poor people frequently use forests as an 'employment of last resort" (Angelsen & Wunder 2003), or as a 'safety net' during periods of hardship (Wunder 2001; McSweeney 2004; Pandit & Thapa 2004). Causality therefore runs from the poor to forest dependence whereby low return and unsustainable activities predominate since the poor lack alternative means to survive or earn or livelihoods. The implication is that the problem of deforestation can be solved by economic growth and poverty reduction, since this results in a shift away from the consumption of basic forest products such as fuelwood in favour of more efficient technologies such as gas stoves, and eventually, to fossil fuels. Economic growth is also supposed to result in lower rates of population growth as incomes improve, and changing agricultural practices via the development of better and more efficient technologies, which raise productivity and thereby reduce demand for cleared land.

The problem however, is that the resource based explanation for deforestation does not seem to account for the difference in deforestation rates between Zambia and Mozambique. This is because, as the case studies show, both countries have experienced very similar demographic and economic related structural drivers of deforestation during the last two decades. Mozambique, like Zambia, experienced high levels of rural migration in the early 1990s following the post war return of refugees and urban dwellers to their traditional homesteads. In Mozambique's case though, these numbered in their millions, rather than hundreds of thousands. In the absence of any alternatives, people in both countries took up agriculture in order to survive. In Zambia, public sector reforms had crippled the ability of the ZFD to monitor these activities and their effects on forests; in Mozambique, surveillance and enforcement were even almost non-existent, due to political pressures and the almost complete destruction of the forest services during the civil war.

In both countries, the liberalisation of agricultural markets imposed by the World Bank and donors reduced the availability of inputs such as fertiliser, eliminated access to markets and increased price volatility. 20 years later, despite the availability of abundant land and water, a significant number of households are not food secure. Rural agricultural markets are characterised by underdevelopment and poor inaccessibility, so even when

smallholders produce a surplus, it is very difficult for them to sell their produce. Agricultural production systems are risky, due to low crop and variety diversification and the lack of fertilisers and other inputs for crops other than maize mean that mono-crop based farming systems are still practised in many places, and that farmers grow their crops in soils and under climatic conditions that are not suitable for In both countries, yields are low and crop failure is frequent, particularly when compounded by the effects of climate change and fluctuating prices (Nuebert et. al. 2011).

At the same time in Mozambique, as in Zambia, subsistence agriculture has been practiced in tandem with charcoal production, which is used as an alternative or supplementary form of income. This has been driven by the profitability of the charcoal trade. For those in the middle of the supply chain, charcoal offers a lucrative source of income. For producers, it is more of a subsistence strategy, but one that is viable since it requires only minimal capital investment and know how. Demand is driven by consumers in urban areas, who continue to rely on charcoal for their energy needs thanks to a lack of access to electricity. Only 22 per cent of Zambians have access to electricity, while in Mozambique the equivalent figure is even less, at 13 per cent. This is not surprising; both countries are extremely large, and electrification has proceeded slowly due to the logistical challenges involved. In both countries the so called energy ladder effect, whereby charcoal usage is supposed to be replaced by better, more efficient fuels, has not occurred either. This is because poverty reduction has stagnated, and consumers continued to prefer charcoal over other energy sources such as gas stoves.

The similarity of these structural drivers suggests a number of interesting conclusions. For a start, they show how difficult it is to estimate the impact of different types of demographic changes on forest cover. In Zambia and Mozambique, deforestation has been caused by agricultural extensification arising as a result of migration from urban centres to rural areas. At the same time, migration from rural areas to urban areas has resulted in increased charcoal production. In both cases, the effects of these different migration patterns has been determined by contextual factors such as the liberalisation of agricultural markets, unemployment and poverty and the continued reliance of people on fuelwood for the energy needs. It is very difficult therefore, to determine whether it was urban-rural migration or rural-urban migration that was the dominant driver in each case. This backs up one of the central theoretical claims made in this thesis, namely, that it is difficult to predict how shifting patterns of population growth and migration are likely to affect deforestation rates via changes in demand for forest lands and resources (Cropper

& Griffiths 1994; Rudel & Roper 1997; Reis & Blanco 2002). It also shows how the impact of demographic pressures are always mediated via other factors that link humans to forests such as technology, markets and institutions (York et. al. 2002; Burns et. al. 2003).

Economic policymaking appears to have played a particularly important role. The lack of improvement in agricultural productivity in both countries appears to be a direct result of reforms which removed or drastically reduced government support in the form of subsidies, credits, extension services and marketing boards. This lends support to those who suggest that free market activity and the pursuit of economic growth are quite capable of producing unequal and unsustainable environmental outcomes when left to their own devices (Shandra 2007; Ozler & Obach 2009). Deforestation in Zambia and Mozambique cannot be simply characterised as the result of a temporary misalignment of market forces, since economic liberalisation appears to have resulted in an improvement to returns to the conversion of forested lands without producing a counteracting effect to mitigate the accompanying levels of deforestation. This provides an alternative to accounts of forest change based on the experiences of advanced industrial countries, and shows why the conduct of economic policy in areas that have both direct and indirect impacts on forests is a crucial consideration for anyone looking to diagnose drivers of forest loss.

The case studies also show how economic growth and poverty elimination do not necessarily result in decreased deforestation (Fisher & Freudenburg 2001; Perz 2007). This is because they do not guarantee the required shift in the composition of a country's economic base, nor can they be relied on to bring about the discursive shifts necessary to change the way a society values forest services. Average per capita income in both countries has more than trebled in the last two decades, yet appears to have had little effect on patterns of forest usage. This is not to say that economic growth has no effect – technological progress, increased efficiencies and sectoral production shifts can certainly still produce more sustainable outcomes for forests in Zambia and Mozambique. However, as these cases show, the context specific questions are all important, because the relationship between income growth and deforestation is governed by complex feedback mechanisms involving multiple institutional channels that affect both market and political forces.

Finally, and most importantly, economic and demographic related factors do not seem to account for Zambia's markedly higher rate of deforestation. Indeed, an argument based on this logic alone would suggest that Mozambique's rate of deforestation should be higher, since it experienced greater rates of rural migration following the end of the war, and has a far greater population density in forested areas of the country. Mozambique has also

experienced many of the economic drivers of deforestation more severely than in Zambia – access to electricity is lower, its population is more reliant on fuelwood for energy needs, and poverty levels are greater, suggesting that a greater overall proportion of the population is reliant on forests for their everyday needs. Accordingly, it appears that resource based explanations for deforestation in Zambia and Mozambique misses out on an important part of the picture, namely, the role of governance and institutions.

## A governance based explanation for deforestation

In order to really understand the structural causes of deforestation in the miombo woodlands, we need to first know who determines who has access to forests and how they are used, monitored and managed. Such an approach looks at the power relations that govern decisions about natural resources, and incorporates the roles of actors and institutions that are usually absent from resource based narratives. It also incorporates a better understanding of the formal and informal rules that directly affect forests through forest management itself, and indirectly through governance in other natural resource related sectors and in the economy as a whole. Accordingly, I call it the 'governance based' explanation for deforestation. Not surprisingly, it is less popular amongst policymakers since it involves issues such as the impunity of powerful political and economic actors, the silencing of community voices, and mismanagement at different levels of the state apparatus. The argument made in this thesis however, is that it offers a better explanation for the difference between Zambia and Mozambique's rates of deforestation. Specifically, it suggests that Mozambique's relatively better record can be attributed to two major institutional factors.

The first is the existence of different land tenure arrangements. Both countries underwent a process of land reform in the 1990s, culminating in the passage of the Land Act of 1995 in Zambia and the Land Act of 1997 in Mozambique. In Zambia's case the reforms created a dual tenure system which divided land according to customary and statutory status. Under customary law users had no legal management privileges or access to formal titles for land ownership in order to avoid dispossession or protect fixed investments. Permission to use land in Zambia was therefore placed at the whim of traditional authorities and in the absence of checks and balances or recourse to formal channels in the case of disputes, that power became open to abuse. Traditional authorities were also given control over the conversion of customary land to leasehold tenure, creating an ongoing tension between commercial demands for strong property rights, and a lack of support for the same founded on customary land rights. At the same time, the 1995 Act vested all land in the name of the President, and allowed for titles to be retracted when valuable resources were discovered. This has left both customary and leasehold land open to confiscation or transfer by the state, creating a hierarchy in which customary land is recognised, but given lower status. At the state level, backlogs in land applications have led to increased boundary disputes, placing significant pressures on government departments. Since land has not been released quickly enough, informal settlements in forest reserves have

increased.

The situation has been exacerbated by the existence of laws stating that land can be secured only as long as it it is utilised for development or commercial purposes. This has meant that under the current system of land management in Zambia, development works against sustainability by definition as well as in action. As a result, for the majority of Zambians who live in close proximity to forests land tenure remains insecure, encouraging those with access (either through traditional authorities or leasehold) to use forests for their maximum potential without thought to long term sustainability. Owners of forest patches are encouraged to use them for fear that others seeking land might make competing claims on the 'unused' land. Meanwhile, migrants moving to new areas will tend to clear more land than necessary in order to secure usage rights, or may approach the local leadership and make the case that patches of apparently unused forest land should be taken from the current holder.

By contrast in Mozambique, the 1997 Land Act gave greater security to communities in the form of the DUAT, allowing them to automatically hold a formal title in their own name, with responsibility for the internal allocation and management of land rights taking place through their own customary systems. Lower order rights acquired by families and individuals in this way were equivalent to a state DUAT and did not need to be registered. This meant they were given stronger guarantees to land via a formal legal arrangement, and faced fewer obstacles to obtaining the rights to use that land as they saw fit. Those requesting new rights to land were required by the Act to consult with local communities to ensure the land was free or to determine the conditions by which local rights should be given up in favour of the newcomer. The onus to prove occupation by a community was therefore placed on the potential investor or the state, rather than the other way around.

Also, by prohibiting private ownership of land, the Land Act discouraged certain types of speculation. The right to buy or sell assets on a piece of land extended only to improvements and constructions made on or to land over which a private person or firm has a DUAT. This has meant that while an effective shadow private property system exists in Mozambique in the form of selling rights to buildings and other infrastructure, it does not apply to the estate or the natural resources on it. Community custodianship is therefore over natural resources and the land itself, promoting greater sustainable long term usage and creating greater long term incentives to maintain forest health. Greater land tenure security has also meant that communities can enter into negotiations with

developers on a more even playing field, and can therefore can derive greater benefits from forests.

The existence of these two different arrangements for land tenure offers a convincing partial explanation for the difference in rates of deforestation in each country. This accords with a significant body of theory which suggests that the security of property rights affects the decision to conserve forests to yield long term sustainable outputs (Rudel 1995; Southgate 1990; Kaimowitz 1996; Angelsen 1999, Mendelhson 1994). Users of forest lands will not forego current consumption for future return without assurance that they have guaranteed usage rights over that land. When owners and users of land are exposed to the risk that their parcel of land will be invaded by squatters, harvested by a timber company or confiscated by a government official, their incentive to invest is diminished. This causes forest users to extract and sell forest goods as fast as possible, or to clear land in order to establish legal claims. Where property arrangements are insecure, deforestation thus becomes a practical method to establish ownership claims. By contrast, where greater security exists in the form of guaranteed usage rights, access to formal channels for disputes, and the absence of speculation, users will tend to utilise forests more sustainably.

The second, and arguably more important reason for the difference in rates of deforestation in Zambia and Mozambique concerns their different legal guidelines for forest management. Both countries inititiated very similar processes to deal with perceived shortcomings in their forest sectors during the 1990s. The new forms of legislation developed as a result involved a radical departure from old, centralised models of forest governance towards more participatory approaches. The laws stated that all stakeholders and particularly communities should be involved in the management of forests, that the role of traditional rulers should be recognised, and that partnerships with local users and the private sector in preparing management plans should be encouraged. Their guiding principles were therefore the idea of inclusiveness.

The big difference of course, was that while both pieces of legislation were passed by their respective parliaments, Mozambique's legislation was the only which was actually implemented. The divergent records of the forest sectors in each country since then are revealing. In Zambia, the non-implementation of the 1999 Forests Act had created institutional paralysis. As a result, forest governance has effectively operated in limbo for most of the period under investigation – first as a result of public sector reforms made in the 1990s, then as result of the Forest Act's non-implementation during the 2000s. The

ZFD is still using licensing and charging arrangements developed under legislation that is now over 40 years old, and no longer fit for purpose. There are still no legal or technical allowances to allow the rollout of participatory forms of forest governance – and without the implementation of the ZFC or the legal backing for JFM and the necessary benefit sharing arrangements, there is no prospect of this happening any time in the near future. The lack of policy and legislative guidelines has acted in tandem with insecure land tenure to leave communities with no incentives to conserve forests at all. It is this, more than any other factor, that is currently preventing Zambia from tackling its current rampant levels of deforestation.

In Mozambique though, the passage of legislation, in combination with strong property rights, resulted in a significant improvement in forest governance. Communities were given greater incentives towards long term sustainable forest resource usage since they now had both access to and usage rights over forests. The Forests and Wildlife Act also allowed the department to enact measures against illegal logging, and to generate improved revenues from formal forest sector activities. While collection of these revenues is still poor, a minimum of 20 per cent goes to communities to incentivize them to look after the forest estate. Clear guidelines on forest laws also allow those officers who are in the field to carry out their job, although this is made difficult by the sheer scale of the task facing them. Forest officers have also received greater incentives to monitor illegal forest activities by the inclusion of the 50 per cent benefit sharing regulation for fines.

This is not to suggest that forest governance in Mozambique is fully functional; as the research reveals, significant challenges still remain. Current institutional funding arrangements result in the perverse situation whereby forests in Mozambique are effectively paying for their own destruction via agricultural programs. The DNTF also continues to face severe resource shortages and enforcement problems, particularly with regard to illegal logging by local and foreign owned companies. These issues are likely to become more problematic in the future. Shortcomings in other related areas, such as agricultural extension, further complicate the challenges already faced by forest services in Mozambique.

Table 7, on the following page summarises the similarities and differences between Mozambique and Zambia's structural causes of deforestation. The table uses the same theoretical categories of structural causes of deforestation outlined in Table 1, on page 61. However, there are some significant differences. Firstly, Table 7 now includes the

designations of ‘resource-based’ and ‘governance-based’ explanations for deforestation. Secondly, where Table 1 contains descriptions of the findings from the general literature, Table 7 contains findings from the specific case studies, and compares and contrasts them according to each category. The table clearly delineates the similarities between the demographic and economic factors in each country and the differences in governance factors. What it shows is that the existence of at least some forms of what might be called ‘good governance’ in Mozambique have gone a long way towards limiting the worst forms of environmental degradation currently being experienced in Zambia.

| Type of explanation | Structural cause | Zambia | Mozambique |
|---|---|---|---|
| DEMOGRAPHIC FACTORS (resource based explanation) | Population growth and density | Population growth and increased density in rural areas has resulted in decrease in average fallow periods for citemene farming, leading to forest degradation. Increased population density in cities has led to an increase in demand for charcoal. | Population growth and increased density in rural areas has resulted in decrease in average fallow periods for citemene farming, leading to forest degradation. Increased population density in cities has led to an increase in demand for charcoal. |
| | Migration patterns | Migration to rural areas occurred following the privatisation of state assets and resulting unemployment in the early 1990s. Led to increased reliance on forests for agriculture and charcoal. | Migration to rural areas occurred due to the return of former refugees to traditional homesteads after the end of the war. Led to increased reliance on forests for agriculture and charcoal. |
| ECONOMIC FACTORS (resource based explanation) | Income growth | Charcoal industry driven by continued demand in urban areas. This is a result of low access to electricity (22 per cent of population). Has resulted in clear cutting and decreased fallow periods for forest patches. | Charcoal industry driven by continued demand in urban areas. This is a result of low access to electricity (13 per cent of population). Has resulted in clear cutting and decreased fallow periods for forest patches. |
| | Economic liberalisation | Agricultural liberalisation and privatisation implemented on the advice of World Bank and other donors. Resulted in unemployment, rural migration and agricultural extensification, rather than intensification. | Agricultural liberalisation and privatisation implemented on the advice of World Bank and other donors. Resulted in unemployment, rural migration and agricultural extensification, rather than intensification. |
| | Poverty | Charcoal production conducted by rural poor as a supplement or alternative to agriculture. | Charcoal production conducted by rural poor as a supplement or alternative to agriculture. |
| | Trade and investment | Some evidence of deforestation due to activities by foreign mining companies. However, overall impact is relatively small. | In recent years problem of illegal logging and increased trade in timber by foreign firms has gotten worse. Monitoring and enforcement is difficult. Overall impact is still relatively small. |
| GOVERNANCE FACTORS (governance based explanations) | Political regimes | Democratic transition in the early 1990s resulted in restructuring of forest sector, with forest services cut due to public sector reforms. Funding for the sector from central government remains low due to low prioritisation of forest sector by state. | Democratic transition in early 1990s meant the end of civil war, and revitalisation of forest services Funding from central government remains low due to low prioritisation of forest sector by state. |
| | Land tenure, property rights and rule of law | Lands Act of 1995 created insecurity due to lack of formal titles and hierarchy of state over traditional authorities. Encourages owners of land to use forests unsustainably. Monitoring remains a problem due to the non-implementation of the Forests Act and institutional paralysis in forest sector | Lands Act of 1997 protected traditional rights to land. Communities given access to and formal control over resources. Encouraged greater sustainable use of forests. Monitoring has improved in recent years, especially following the passage of Forestry and Wildlife Act. However, significant capacity challenges remain. |
| | Participatory forms of forest governance | Forests Act of 1999 not implemented. Centralised model of governance still in place. Pilot projects have failed due to non-implementation of Forests Act. No mechanisms for benefit sharing exist. | Forests and Wildlife Act of 1999, and Regulation of 2002 created participatory model of forest governance. Pilot projects have experienced mixed degrees of success. Benefit sharing mechanisms for communities in place. |
| | International institutions | Signatory to majority of international conventions on climate change and forest conservation. However, these appear to have had little overall effect on forest policy. REDD pilot projects implemented, but lack of benefit sharing arrangements has limited their effectiveness. | Signatory to majority of international conventions on climate change and forest conservation. However, these appear to have had little overall effect on forest policy. Some REDD pilot projects in place, but hampered by policy uncertainty and lack of resources and monitoring |

**Table 9**: A comparative analysis of the structural causes of deforestation in Zambia and Mozambique

## Conclusion

This thesis has shown that, for two of the main miombo countries, Zambia and Mozambique, a constellation of economic, demographic and governance related structural causes have resulted in two very different patterns of deforestation. The differences in these patterns appear to be accounted for primarily by governance related factors, and in particular, land tenure arrangements and forest sector specific legal guidelines. The focus on the the role of governance and institutions situates the research firmly within the existing body of scholarship on institutional drivers of deforestation. Until now, most claims for a connection between deforestation and institutional arrangements have either not paid sufficient attention to specifying their origin and outcomes within different historical, socio-economic and political contexts or where they have done so, have failed to take into account the effect of institutional arrangements in other related areas such as agriculture or energy.

This thesis has attempted to tackle these shortcomings by analysing the causes of deforestation in one of the less studied forest regions of the world, and has presented new evidence on claims around the influence of institutional factors such as property rights, legislation and participatory approaches to forest governance. The findings suggest that greater recognition of community rights and more power over forests for communities can help achieve improved forest outcomes. This adds to the growing body of evidence for the claim that local actors have the capacity to protect and use forest resources sustainably and at lower costs than government agencies (Nelson & Agrawal 2008; Poteete & Ostrom 2008; Agrawal 2012;). This is because community control makes greater use of the capacity of local users to identify and prioritize environmental problems more accurately. Local groups are also more likely to respect locally generated rules, making resource use monitoring easier to conduct. In the case of Zambia and Mozambique, issues around access to forest resources and the existence (and non-existence) of benefit sharing mechanisms appear to have been particularly important. Mozambique's relatively better record in these areas appears to be one of the defining factors in its relatively lower rate of deforestation.

At the same time, the analysis shows why it is important to take into account the real level of benefits and the associated choices people in rural communities actually make about whether to conserve forests or not. This is because outcomes depend on range of

conditions including benefits derived from alternative land uses such as agriculture and charcoal production. In this sense, community based natural resource management does not operate in isolation; even if ideal models of devolved governance were implemented in other cases forest conservation would not necessarily follow. This is why the advantages and disadvantages of transferring control over resources to communities are better considered within whatever locally based resource management paradigm is most appropriate, e.g. co-management, joint forest management, common pool resource based management, or private access and property rights.

From a research perspective the thesis represents only a glimpse into a potentially rich and complex avenue of enquiry. The results of the case studies certainly provide some strong clues as to the structural causes of deforestation in other miombo countries, but these cannot be confirmed without further investigation. In this regard history, geography, and social and economic contexts obviously matter. Future research would therefore do well to look more closely at the impact and interplay of economic, demographic and economic forces on drivers of deforestation in other heavly forested miombo contries such as Tanzania, Angola, Malawi, Zimbabwe. Proximate causes of deforestation in these countries are relatively similar to those in Zambia and Mozambique, and they share a number of structural socio-economic conditions too, such as high rates of poverty, low access to electricity, and economies which are dominated by smallholder agriculture.

It would therefore be very interesting to see how economic, demographic and governance related factors have played out in other miombo countries, and how their forests have been affected as a result. In particular, there is a need for more research into different kinds of institutional arrangements. How have other miombo countries dealt with issues around customary tenure vs. private or leasehold tenure? What is the relationship between the state and traditional authorities? To what extent have decentralisation reforms been initiated, and what is the difference between policy and actual practice in this area? What kind of legislation is in place governing access to and usage of forest resources and how does this either compliment or conflict with legislation in other sectors? In both Zambia and Mozambique, answers to these questions have proved to be crucial in trying to understand the structural causes of deforestation, and are likely to be so for other miombo countries too.

There is also a need for more qualitative research incorporating governance based explanations for deforestation in other developing countries. Many studies and reports on mention that forest governance in a particular country is 'bad' but fail to specify exactly how and why that is the case. More questions therefore need to be asked about how governance in countries with large expanses of forest is structured at the most general level, and how much power resides in different types of public, private and civil society organisations. Land tenure and different ownership arrangements are particularly important in this regard since they determine who owns what and where, and what types of land use activities are likely to take place. Other factors to consider are the rule of law, how rules and regulations are both designed and enforced, the balance of power between central governing institutions and those at the provincial and local levels, and different arrangements for community based management regimes. These are questions which deserve further investigation in the context of the rampant deforestation which is occurring worldwide, and which could provide decisive in trying to implement policies to try and prevent it.

It would also be interesting to combine qualitative case studies into governance and institutional arrangements with larger, macro scale quantitative research. Until now, a lot of cross national studies have focused on resource based explanations which emphasise the role of economic and demographic factors. This is because it is easier to obtain panel data for these variables at a global scale. Previous studies have covered the effects of population growth (Allen & Barnes 1985; Uusivori et. al. 2002; Ehhardt-Martinez 1998; Cropper & Griffiths 1994); migration patterns (Rock 1996; Templeton & Scherr 1999; DeFries et. al. 2010) income growth (Koop & Tole 1999; Shafik and Bandhyopdhay 1992; Panayatou 1997; Antle & Heidebrink 1995; Meyer et. al. 2003; Culas & Dutta 2002; Rudel 1998; Mather et. al. 1999) macroeconomic policies (Capistrano & Kiker 1995; Kessler & van Dorp 1998; Kahn & McDonald 1995; Arcand et. al. 2008) and trade and financial liberalisation (Jorgensen & Rice 2005; Jorgensen 2006; Godoy et. al. 1997; Wunder 2003; Rudel 2007).

It is more difficult to obtain useful cross national panel data for measures of governance, and the literature in this area is therefore not as comprehensive. Some research has been done for example on the impact of corruption (Koyuncu & Yilmaz 2009), on property rights (Southgate 1998; Deacon 1999) and on political rights and civil liberties (Bhattarai & Hammig 2001). However as this thesis has shown, 'governance' is a broad term,

encompassing additional factors such as the such as regulatory burden, the quality of budgetary and financial management, the efficiency of revenue mobilisation, the efficiency of public expenditures and transparency, accountability, legal guidelines and degrees of decentralisation and devolution. Accordingly, it would be useful to try and quantify the impact of governance via a cross national study for example, on measurements of the strength of participatory governance in legislative arrangements, or on the security of land tenure in countries with customary systems of land administration.

From a policy perspective, the research suggests that countries looking to limit deforestation would do well to look more closely at how current governance and institutional arrangements are affecting their forests. Why? Because governance revolves around the question of how forests should be managed, by whom and for whose benefit (Hobley 2007). It therefore largely determines the overall impact of demographic and economic drivers of deforestation. Understanding governance applies not only forest sectors, but also other, related sectors such as land, agriculture and energy. As this the cases show, understanding the linkages between these sectors is important since institutional arrangements or policy measures in one area can often have unintended consequences in another.

The good news is that it is far easier to bring about a change in institutional arrangements than it is to do something about demographic or economic drivers. Factors such as population growth or migration patterns are largely beyond the control of policymakers. They have a bit more control over economic policymaking, but in many respects their hands are tied by international market pressures and the spillover of the economic policy making sphere beyond borders. Likewise while poverty reduction is a key policy aim for most developing countries, it is notoriously difficult to achieve. Trying to achieve reduced deforestation via reductions in poverty levels is not a realistic aim; the proliferation of international development agencies in the sub-Saharan African region and their mixed record in this area speaks volumes for how difficult this is as a policy goal. Nor is it guaranteed to be effective – as the case studies show, improved incomes do not always result in less deforestation.

This is not to say that policy should ignore economic drivers of deforestation altogether. Extending access to electricity for example, is a policy measure that would make a major

difference to rates of deforestation in the miombo woodlands via the elimination of the charcoal trade. The benefits of increased energy access in the region would also be transformational for the lives of the poorest – lighting for schools, functioning health clinics, pumps for water and sanitation, cleaner indoor air, faster food processing and more income generating opportunities, among others (Kanagawa & Kanata 2008; Wilkinson et. al. 2009; Clancy et. al. 2012). However, as the analysis shows there are major logistical challenges involved in trying to extend grid access in countries as large as Zambia and Mozambique. There are also problems with patterns of consumption, given urban consumers' preference for traditional fuels and the short term decision making horizons and inability of the poor to pay for electricity access. These challenges suggest the timeline for providing access to electricity will be measured in decades rather than years.

Institutional changes therefore, appear to offer the easiest way to bring about changes in rates of deforestation in the miombo woodlands. The devolution of forest governance to communities for example, appears to serve as a strong incentive towards sustainable forest resource usage. However, it is not enough for policymakers to commit to decentralisation on paper – reforms need to be backed by specific mechanisms, including legislative directives that give communities actual access to and control over forest resources, that give them bargaining power with investors, and that institute real benefit sharing mechanisms. As the failure of the PFAP II program in Zambia vividly shows, in the absence of these measures, participatory forest management is doomed to fail. Good intentions, well designed programs and plenty of funding are powerless in the face of weak institutional arrangements and poorly defined legal guidelines.

The research also shows that land tenure is a promising area of reform for miombo countries looking to protect natural resources such as forests. It suggests that a compromise needs to be found between accommodating the needs of traditional land arrangements, and promoting security via formal land registration and adjudication procedures. There are of course, many ways to do this – the solution imposed by Mozambique is just one of them and is by no means perfect. The country is still experiencing issues around land in the form of increased scarcity, pressure from foreign investors and corruption within the state apparatus. Such challenges notwithstanding, land tenure arrangements in Mozambique still provide more of an incentive for forest conservation than they do in Zambia. There, land tenure arrangements have tended to

promote insecurity via both the statutory and customary components of the law. Countries looking to promote security of tenure would therefore do well to look at the way in which Mozambique has managed to chart a course between demand for land, livelihoods security and sustainability.

Of course there is still likely to be resistance to institutional reforms, since they speak to the problems of institutionalised power and vested interests. The current configuration of political interests in Zambia for example, has now delayed the implementation of a Forests Act for more than 13 years. The reason for this is that institutional changes there threaten the autonomy and jobs of those in charge. Those in power suggest there is very little that can be done about high rates of deforestation, since this is driven by economic and political factors outside of their control. However, the governance-based explanation for deforestation reveals that such claims are disingenuous at best. They provide policymakers with a convenient excuse for inaction, and mask the problems of governance that lie at the true heart of the problem. Accordingly, until greater pressure is brought to bear on these interests via either other governmental channels or more powerful international actors, bottlenecks to reform will remain.

One potential means to create that pressure exists in the form of the UN's REDD+. As currently conceived, REDD+ is based on the logic that deforestation is a market externality, and if the true economic value of forests, and in particular their usefulness as stores of carbon could be actually accounted for, then government and individuals would forego deforestation in exchange for other less costly activities. However as this analysis has shown, trying to address deforestation via market based mechanisms is doomed to failure unless it is accompanied by the proper institutional arrangements. There is no point in providing financing for communities for example, if there are no benefit sharing mechanisms to get that finance to communities in the first place. The fate of the PFAP II program in Zambia is again illustrative – substantial financing for community based forestry was provided, but in the absence of the right legal frameworks to channel those proceeds to communities the program proved economically unviable.

International financing for forest conservation in the form of programs such as REDD+ should therefore be concerned first with asking what kind of rules and regulations can be put into place that will incentivise forest users to conserve forests for their long run value, rather than to cut them down for short term benefits. What is sure is that if issues

such as land tenure, access to forests, usage rights, benefit sharing mechanisms and institutional governance are not adequately addressed, it will make no difference how much money international financing offers in the end. In other words, should REDD+ attempt to implement financing for the conservation of forests in the miombo countries based on economic logic alone, it runs the risk of addressing symptoms of the problem rather than its true causes. Unless those causes are properly addressed by policymakers, deforestation rates in the miombo eco-region will continue to occur at high and unsustainable rates.

None of these policy prescriptions suggest that deforestation in the miombo woodlands can be eliminated completely; some of the miombo countries rank amongst the poorest in the world and all of them face significant social and economic challenges. What the results of this research do suggest however, is that even in the context of high rates of poverty, poor agricultural productivity and a lack of institutional resources, it is possible to create policies that are progressive and contribute towards forest conservation. If countries in the miombo eco-region can find a way to incentivise users to conserve forests, to redistribute benefits to communities in such a way as to encourage long term sustainability and to create institutional safeguards to ensure that political barriers are not erected to prevent those reforms, then they can make a major difference to their overall rates of deforestation. That is why governance really matters for the fate of the miombo forests of southern Africa.

Figure 18: Sun setting over miombo forests near Chimoio, Manica Province. *Authors's own image*

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# Annex 1: List of interviewees

## Zambia

| Surname | Name | Position | Organisation | Location | Date |
|---|---|---|---|---|---|
| Banda | Mathew | Director | Forestry and Environmental Vision | Kitwe | 21st March 2011 |
| Bangwe | Lewis | Food Security | AfDB | Lusaka | 1st March 2011 |
| Bergschneider | Martina | Managing Director | Southern BioPower Ltd | Lusaka | 8th March 2011 |
| Carr | Judy | CBNRM practitioner | Norman Carr Foundation | Lusaka | 23rd February 2011 |
| Chandipo | Rodwell | Acting National Project Coordinator | Environmental Council of Zambia | Lusaka | 14th March 2011 |
| Chimambo | Robert | Chairperson | Chalimbana River Conservation Committee | Lusaka | 18th February 2011 |
| Chisanga | Eric | General Manager | Zambia Forest and Forestry Industries Corporation | Ndola | 25th March 2011 |
| Dauchi | Ben | Environment Management Officer | MTENR | Lusaka | 8th March 2011 |
| Davies | Ben | Climate Change Advisor | DFID | Lusaka | 8th March 2011 |
| de Voogd | Hans | Counsellor | Netherlands Embassy | Lusaka | 17th March 2011 |
| Francis | Patrick | Environmental Fund Advisor | MTENR/ENRMMP | Lusaka | 10th March 2011 |
| Goulding | Adam | Assistant Director | WECSZ | Lusaka | 24th February 2011 |
| Gumbo | Davison | Country Director | CIFOR | Lusaka | 25th February 2011 |
| Hampwaye | Godfrey | Head | Geography Department School of Natural Sciences (UNZA) | Lusaka | 10th March 2011 |
| Hastings | Elizabeth | Research Consultant | Pegasys | Cape Town | 28th January 2011 |
| Hengeveld | Frederick | Director | The Kafue Trust & Open Africa | Lusaka | 1st March 2011 |
| Imakando | Moosho | Programme Officer | Norwegian Embassy | Lusaka | 23rd February 2011 |
| Jain | Prem J | Technical Director,Climate Change Facilitation Unit | MTENR | Lusaka | 16th March 2011 |
| Kanyanga | Joseph | Head of Program | Southern African Fire Network/Zambia Metorological Department | Lusaka | 18th March 2011 |
| Kapwepwe | Chilufya | Founder | Imiti Ikula Empanga Environment and Development Organisation | Lusaka | 24th February 2011 |
| Kasali | George | Lecturer | Copperbelt University | Kitwe | 21st March 2011 |
| Kasaro | Deuteronomy Kasaro | Extension Officer, Department of Forestry | MTENR | Lusaka | 1st March 2011 |
| Kawanga | Victor | National Coordinator | Commonwealth Forestry Association, Zambia | Lusaka | 18th February 2011 |
| Kokwe | Misael | Mainstreaming Advisor | MTNER | Lusaka | 1st March 2011 |
| Luukkanen | Villa | Private Sector Development and Aid for Trade | Embassy of Finland | Lusaka | 23rd February 2011 |
| Lwatula | Celestina | Programme Officer for ILUA | FAO | Lusaka | 15th March 2011 |
| Makano | Rose | Consultant | | Lusaka | 18th February 2011 |
| Malambo | Fabian | Lecturer, School of Natural Resources | Copperbelt University | Kitwe | 21st March 2011 |
| Matakala | Patrick | Head | WWF Zambia | Lusaka | 14th March 2011 |
| Mate | Litumelo | Programme Officer | Danish Embassy | Lusaka | 14th March 2011 |
| Mlambo | Choolwe | Director Programmes | Green Enviro-Watch | Lusaka | 22nd February 2011 |
| Mubambasu | Rosina | Manager | MTENR | Lusaka | 7th March 2011 |
| Mulenga | Francis | District Forest Officer, Mpika | MTENR | Mpika | 27th March 2011 |

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|---|---|---|---|---|---|
| | Mutale | | | | |
| Mulolwa | Augustine | Director | National Remote Sensing | Lusaka | 9th March 2011 |
| Mulongwe | Lishomwa | Principal Research Officer, Silviculture | Division of Forest Research | Kitwe | 22nd March 2011 |
| Musamali | Abel | CEO | Green Enviro-Watch | Lusaka | 22nd February 2011 |
| Musonda | Lucky | Project Officer | UNDP | Johannesburg | 10th February 2011 |
| Musonda | Winnie | Energy & Environment Advisor | UNDP | Lusaka | 2nd March 2011 |
| Mutumba | Emmanuel | Team Director | Green Living Movement | Lusaka | 25th February 2011 |
| Muvundicka | Aleck | Head of Water, Energy and Env Program | NISIR/Chairperson for CDM | Lusaka | 28th February 2011 |
| Mwelwa | Elen | Environment Manager | Zambia Electricity Supply Corporation (ZESCO) | Lusaka | 4th March 2011 |
| Mwenechanya | Mbosonge | Consultant | COMESA | Lusaka | 15th March 2011 |
| Mwitwa | Cholwe | Manager, Planning and Policy | Zambia Development Agency | Lusaka | 4th March 2011 |
| Mwitwa | Jacob | Head of Faculty, School of Natural Resources | CBU | Kitwe | 22nd March 2011 |
| Namayanga | Lemmy | Inspector | NECZ | Lusaka | 10th March 2011 |
| Ndhlovu | Elizabeth | Sector Advisor in environment and natural resources | Finnish Embassy | Lusaka | 16th March 2011 |
| Ng'andwe | Phillimon | HOD, Department of Wood Science & Technology | UNZA | Kitwe | 22nd March 2011 |
| N'gombe | Assan | Advisor | UNDP | Johannesburg | 10th February 2011 |
| Njovu | Felix | Lecturer, School of Natural Resources | Copperbelt University | Kitwe | 21st March 2011 |
| Nyoni | Moses | Site Support Group Coordinator | Zambian Ornithological Society | Lusaka | 21st February 2011 |
| Ojanen | Marja | Counsellor, Environment and Natural Resources | Finnish Embassy | Lusaka | 16th March 2011 |
| Paumgarten | Fiona | Former Reseacher | CIFOR, Zambia | Johannesburg | 10th February 2011 |
| Pavy | Jean Michel | Natural Resources | World Bank | Lusaka | 9th March 2011 |
| Phiri | Michael Annel | M & E Specialist | Environmental Council of Zambia | Lusaka | 15th March 2011 |
| Rachel | Mbanda, | District Forest Officer, Solwezi | MTENR | Solwezi | 24th March 2011 |
| Ruth Simwanza | Ruth | Office Coordinator | Wildlife Conservation Society | Lusaka | 9th March 2011 |
| Sekelechi | Edwin | Founder | Food and Trees for Zambia | Solwezi | 23rd March 2011 |
| Shitima | Ephraim | Technical Committee Head of DNA | MTENR | Lusaka | 3rd March 2011 |
| Siampale | Abel | Forester | MTENR | Lusaka | 28th February 2011 |
| Sichilongo | Mwape | Facilitator | WWF/Zambia CBNRN Forum | Lusaka | 10th March 2011 |
| Silasini | Charity | Office Assistant | Museum of Natural History | Lusaka | 9th March 2011 |
| Silengo | Mitulo | Director | Disaster Management Training Centre | Lusaka | 4th March 2011 |
| Sinkala | Thomas | Chairman | Biofuels Association Zambia | Lusaka | 17th March 2011 |
| Sosis | Karin | Programme Coordinator for the Project Implementation | African Carbon Credit Exchange | Lusaka | 17th February 2011 |
| Syampungani | Steven | School of Natural Resources | Copperbelt University | Lusaka | 22nd February 2011 |
| Tibaire | Emmanuel | Environmental Advisor | MTENR/CCFU | Lusaka | 7th March 2011 |
| Trefellner | Klaus | Founder | Alternative Fuels project | Lusaka | 7th March 2011 |
| Vinya | Royd | PhD Student | Oxford | Cambridge | 11th December 2010 |
| Wamunyima | Sitwala | Forestry Department | MTENR | Lusaka | 9th March 2011 |
| Yawe | Agnes | Office Manager | PELUM Association | Lusaka | 24th February 2011 |
| Ziba | Vincent | Director | SAFIRE – Sustainable Forest Management | Lusaka | 3rd March 2011 |
| Zimba | Noah | Founder | Citizens for Better Environment /HEBSZ | Lusaka | 18th February 2011 |

## Mozambique

| Surname | Name | Position | Organisation | Location | Date |
|---|---|---|---|---|---|
| Bila | Adolfo | Lecturer, Dept. of Forestry | UEM | Maputo | 1st June 2011 |
| Salomao | Alda | Executive Director | Centro Terra Viva | Maputo | 24th May 2011 |
| Issufo | Alima | Head of Forestry Department | DNTF | Maputo | 27th June 2011 |
| Sitoe | Almeida | Lecturer, Dept. of Forestry | Eduardo Mondlane University | Maputo | 20th May 2011 |
| Reis | Ana-Paula | Consultant | TFCA | Maputo | 23rd June 2011 |
| Saide | Antonio | Chairman | National Directorate of Renewable Energies | Maputo | 29th June 2011 |
| Cuco | Arlito | Former Director | DNFFB | Maputo | 28th June 2011 |
| Macome | Armando | Fiscal | SPFFB | Beira | 30th June 2011 |
| Zolho | Brit Reichelt | Project Executant | WWF Mozambique | Maputo | 13th June 2011 |
| Bias | Calisto | Director Geral | IIAM | Maputo | 27th June 2011 |
| De Sousa | Camilla | Researcher | National Institute of Rural Development | Maputo | 24th June 2011 |
| Cuambe | Carla | Project Officer | FAO | Maputo | 17th June 2011 |
| Serra | Carlos | National Director of Agrarian Policy | ORAM | Maputo | 11th June 2011 |
| Davies | Carrie | Manager | Beira Commercial Institute | Beira | 29th June 2011 |
| Donovan | Cynthia | Professor, Agricultural Economics | Michigan State University | Maputo | 28th June 2011 |
| Ribeiro | Daniel | Activist | Justica Ambeintal | Maputo | 20th June 2011 |
| Sousa | Daniel | Head of Agricultural Development | World Bank | Maputo | 8th June 2011 |
| Macqueen | Duncan | Head Researcher | IIED | Edinburgh | 17th July 2011 |
| Baixo | Eduardo | Minister Assistant | MICOA | Maputo | 7th June 2011 |
| Langa | Eduardo | Former Manager | DNFFB | Maputo | 22nd June 2011 |
| Lundgren | Eric | Country Director | Africare | Maputo | 2nd June 2011 |
| Manhica | Eugénio | Research Extension | DNTF | Maputo | 23rd June 2011 |
| Saifodine | Farida | Programme Officer, Environment | DANIDA | Maputo | 9th June 2011 |
| Munguambe | Felicidade | Former Director | MICOA | Maputo | 22nd June 2011 |
| Zermoglio | Fernanda | Policy Manager | National Institute of Disaster Management | Maputo | 21st June 2011 |
| West | Flemming | Counsellor, Environment | DANIDA | Maputo | 3rd June 2011 |
| Jungbluth | Frauke | Agricultural Development Analyst | World Bank | Maputo | 2nd June 2011 |
| White | Graeme | Owner | TCT Dalmann | Beira | 29th June 2011 |
| Garrett | James | Country Director | IFPRI | Maputo | 2nd June 2011 |
| Hatton | John | Partner | | Maputo | 8th June 2011 |
| Lissave | Jose Caetano | Fiscal | SPFFB | Beira | 30th June 2011 |
| Colin de Verdiere | Karen | Analyst | AFD | Maputo | 28th June 2011 |
| Nakala | Mandrate Oreste | Deputy National Director | DNTF | Maputo | 17th June 2011 |
| Ferrao | Manuel | Head of GIS | Centro Nacional de Cartografia e Teledetecção | Maputo | 19th May 2011 |
| Magaia | Maria Augusta | Head of Office | SPFFB, Beira | Sofala | 1st July 2011 |
| Souto | Mario | Managing Director | COWI Mozambique | Maputo | 24th May 2011 |
| Falcão | Mário | Professor, Forestry | UEM | Maputo | 21st June 2011 |
| Morgues | Mario Ruy | Land Specialist | MCA-Millenium Challenge | Maputo | 2nd June 2011 |
| Couto | Mia | Partner | Terraviva | Maputo | 16th May 2011 |

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|---|---|---|---|---|---|
| Rein | Mikael | Chief Technical Advisor | FINIDA | Maputo | 8th June 2011 |
| Navunga | Milagre | Director | MICAIA | Chimoio | 3rd July 2011 |
| Ant'onio | Nhagumbo Diuis | Fiscal | SPFFB | Gorongosa | 1st July 2011 |
| Manso | Osvaldo | Forest Sector Support Officer | DNTF | Maputo | 23rd June 2011 |
| Botillen | Øystein | First Secretary | NORAD | Maputo | 8th June 2011 |
| Uaiene | Rafael | Agricultural Research Fellow | IFPRI | Maputo | 17th June 2011 |
| Zacarias | Rita | Research Director, Climate Change | DFID | Maputo | 31st May 2011 |
| Mabunda | Rito | Forestry Officer | WWF Mozambique | Maputo | 10th June 2011 |
| Morley | Rob | Director | Sustainable Forestry Management Africa | Johannesburg | 13th May 2011 |
| Ramalho | Rodrigo | Director, Dept. of Planning | MICOA | Maputo | 10th June 2011 |
| Magane | Samiro | Manager, Transfrontier Conservation Areas | MITUR | Maputo | 10th June 2011 |
| Wertz-Kanounnikoff | Sheila | Country Director | CIFOR | Maputo | 20th June 2011 |
| Alves | Teresa | Head of Forestry Research | IIAM | Maputo | 25th May 2011 |
| Chavana | Xavier | Accounts Manager | MPD | Maputo | 21st June 2011 |